ANNALS OF MEDICAL HISTORY

PUBLISHED BIMONTHLY

New Series, Vol. VII, No. 2 MARCH, 1935 Whole No. 78

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NEW YORK
PAUL B. HOEBER, INC., PUBLISHERS
SEVENTY-SIX FIFTH AVENUE

ANNALS OF MEDICAL HISTORY

NEW SERIES, VOL. VII, NO. 2 MARCH, 1935 WHOLE NO. 78

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Original articles are published only with the understanding that they are contributed exclusively to the ANNALS OF MEDICAL HISTORY. Manuscripts offered for publication, books for review, and all correspondence relating to the editorial management should be addressed to the Editor, Dr. FRANCIS R. PACKARD, 302 South 19th Street, Philadelphia, Pa.

Communications regarding subscriptions, reprints, and all matters regarding the business management of the ANNALS OF MEDICAL HISTORY should be addressed to the publishers, PAUL B. HOEBER, INC. 76 Fifth Avenue, New York City. [Cable address, Formed N. Y.]

The ANNALS OF MEDICAL HISTORY is published six times a year, the six issues comprising one volume. No advertising is carried. The subscription price is $10.00 a year, foreign $11.00. Current single numbers $2.50 per copy. A few sets of first series, Volumes I–X, are available in parts as published at $100.00 per set, or bound in boards, paper sides, canvas back, paper label, $135.00 per set. Price on available single volumes or numbers will be quoted on request.

Entered as second-class matter, June 2, 1917, at the Post Office, New York, N. Y., under the Act of March 3, 1879

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Frontispiece
Annals of Medical History
March, 1935

WILLIAM COWPER

⟦1666-1709⟧

[From Erastus: Varia Opuscula Medica. Francofurdi, 1590.]

ANNALS OF MEDICAL HISTORY

New Series, Volume VII March, 1935 Number 2

ROBERT KOCH

(1843–1910)

AN AMERICAN TRIBUTE

Part I

By LAWRASON BROWN, M.D.

SARANAC LAKE, N. Y.

IT seems fitting in our busy lives to pause this year (1932) to do homage to the memory of one of the immortals of this earth, Robert Koch, discoverer of the use of solid media in bacteriology, discoverer of the method of obtaining pure cultures of bacteria, discoverer of the methods of sterilization against bacteria (thus making modern [aseptic] surgery possible), discoverer of tuberculin, discoverer among other bacteria of the tubercle bacillus, just fifty years ago; in fact the Father of scientific bacteriology. He takes his place with Pasteur and Lister among the great benefactors of mankind.

In 1876 at the head of the Botanical Institute in Breslau was Ferdinand Cohn,* the greatest figure in bacteriology before Koch, who had worked out the first morphological classification of bacteria, putting bacteria in the vegetable kingdom, and had found spores in Bacillus subtilus, for up to this time bacteria were still considered a part of Botany. The work of Schroeder on pigment bacteria, done under Cohn, is still a classic.

On April 22, 1876, Cohn received a letter from Wollstein in Posen. "Esteemed Herr Professor," it began . . .

> Stimulated by your work on bacteria published in Contributions to the Biology of Plants, I have for some time been at work on investigations of anthrax con-

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* Called "Pflanzen-Cohn" to separate him from "Augen-Cohn" (H. L.).

tagium, as I was able to secure the necessary material. After many vain attempts, I have finally been successful in discovering the process of development of the Bacillus anthracis. After many experiments, I believe to be able to state the results of these researches with sufficient certainty. Before I bring this into the open I respectfully appeal to you, esteemed Herr Professor, as the foremost authority on bacteria, to give me your judgment regarding this discovery. Unfortunately I am unable to prove this by means of preparations containing the individual stages of development as the attempt to conserve the bacteria in the respective fluids has failed. I would, therefore, respectfully request you to permit me to show you, within the next few days, in the Botanical Institute, the essential experiments. Should you, highly esteemed Professor, be willing to grant my humble request, will you kindly appoint the time when I may come to Breslau? With the highest esteem, Yours Respectfully, R. Koch, District Physician.

But who was this Robert Koch? And why was Cohn so interested in his work?

HIS EARLY YEARS

Born in 1843 at Clausthal, on the western or Hanover Slope of the Harz Mountains, a "perfect epitome of mineralogy," one of the elder of thirteen children, the third child and one of the eleven boys, son of a Bergrat, a scientific superintendent of mines,* Robert Hermann Heinrich Koch was frugally reared on black bread, sweet and butter milk, legumes, butter and cheese only at night, white bread Sunday morning and meat twice a week. He knew such luxuries as coffee, sugar, tea, only by name. He received poor instruction in the local Gymnasium where discipline was such that the teachers and not the pupils were at times chastised. Though he had announced that he would study philology, later he decided upon a mercantile career as he loved to travel. The family were ultimately able financially to send him to the University of Goettingen, where finally he studied medicine under Henle, Hasse and Meissner. His industry won for him a place in the pathological museum and, signing an essay on the "Ganglion Cells of the Nerves of the Uterus" with the phrase, *Nunquam otiosus*, never at leisure, he won a prize. His graduation thesis was on the origin of succinic acid in the body and in its preparation he succeeded in upsetting his own stomach.

Graduating in 1866 at nineteen, after a short interneship in the general hospital in Hamburg, he accepted a position as externe in a hospital for the insane at Langenhagen, near Hanover, and began private practice with the purchase of a riding horse. Shortly after graduating, when he still had plans to become a ship's surgeon in order to see the world, he had become engaged, by promising to give up such ideas, to a boyhood sweetheart, Emmy Adolphine Josephine Fraatz, also of Clausthal, daughter of a Lutheran minister. They were now (1867) married and in 1868 Koch's only child, a daughter, Gertrude, was born. He made little headway financially, and resigned and moved to Niemegk, but fared no better and considered emigrating to America where he had two or three brothers. Moving again in

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* The German miner of these times, where skill and art were required, had been considered not long before a servant of God, combating demons of the subterranean deep, a member of a mystic craft. With these men, young Koch spent much time collecting specimens of minerals.

July 1869 to Posen, he settled in Rakwitz, where he soon had a satisfactory practice and could afford to buy some experimental animals. Previously rejected on account of his nearsightedness, he voluntarily enlisted for the short Franco-Prussian war. On his return, after five months' experience in field surgery, his practice increased and in 1872 he was appointed at a yearly salary of 900 marks District Physician to Wollstein, a nearby town of 4000 inhabitants, where he already enjoyed what consultation practice there was.

LIFE AT WOLLSTEIN

Posen was the most benighted province of Germany, more Polish than German, and to eke out a restricted living, he spent many a long Polish winter night jogging on horseback over rough roads to see a child with croup, to usher into the unknown the soul of some expiring peasant or into this stormy known the child of another, and all this for small fees, counting as successful the day when he made as much as five or six dollars. Nearsighted, rather slender, full bearded, somewhat brusque, little given to society, a man of few words except to intimates, respected for his ability but hardly loved by his fellow citizens who saw little of him (he was the busiest physician in the village), he worked in his little laboratory formed by curtaining off a portion of his private office. I doubt if the corner of any private office has ever meant as much to the suffering world. Here he placed a microtome, a home-made incubator built by himself, and an old fashioned microscope. He was unable to buy a modern microscope but his good wife by scrimping and saving finally collected, no doubt in an old stein, a fund sufficient to make him a present on his birthday of a new microscope, such as he desired.

Koch had studied medicine for the reason that by doing so he might indulge in his hobby for natural history. He always found time to do some microscopic work and was especially interested in algae. At this time anthrax was decimating the herds of cattle and the flocks of sheep of a large part of Europe, and when he had a little leisure he worked constantly upon this disease for, as he says, it was at hand. He had to devise all his implements; but with his ingenuity this apparently caused him little difficulty. For example, he inoculated his mice from one to another, with little slivers of wood.

Now Ferdinand Cohn himself had worked unsuccessfully on the problem of attempting to isolate a pure strain of bacteria for he realized that until this was done little advance could be expected. I have no doubt he was delighted to receive such a letter but I also feel sure that on account of previous disappointments he dared not let his hopes rise too high.

BACTERIOLOGY BEFORE KOCH

To grasp what all this really meant to Cohn it is necessary to go back a century to the time when Leeuwenhoek improved the microscope, when was revealed to man for the first time a new world, so confused, so puzzling, that the findings were grouped by Linnaeus, the botanist, under the head of "Chaos." The germ theory of disease was not new for Plenciz had believed in a *contagium vivum*, putrefaction was said to be caused by living organisms (Spallanzani, Schultze), and the inoculation into the thigh of pus from a syphilitic chancre had produced a pustule containing the same vibrios as were found in the chancre (Donne, 1837).

In 1837, the small round bodies noted previously in beer were seen to grow as the fermentation increased, and were considered to be living plants, called by Turpin, *Torula cerevisiae*. At this same time Bassi showed that muscadine, a contagious disease of the silk worm, was due also to a minute plant. These discoveries opened the flood gates of wild and reckless speculation which were closed only when Jacob Henle wrote in 1840: "Before microscopic forms can be regarded as the cause of contagion in man they must be found constantly in the contagious material, they must be isolated from it and their strength tested." This, however, did not imply necessarily that the contagious material was living. Remember that this was almost forty years before Koch announced his postulates.

Between 1857 and 1870, Pasteur had demolished spontaneous generation, had proved organic decomposition due to germs capable of self-regeneration, had demonstrated that fermentations resulting in lactic, acetic and butyric acids, as well as diseases of wine, were caused also by minute organisms differing in shape and characteristic from each other, and had further shown that pebrine, a disease of the silk worm, was due to a parasite, and had suggested how to control it. Pasteur, however, did not attempt to isolate pure cultures nor engage in morphological studies. Lemaire, an apothecary, experimenting with carbolic acid, discovered that living microscopic plants were prevented by it from growing, while true ferments continued to act. A little later Lister, unaware of Lemaire's work, developed brilliantly his antiseptic technique for surgery.

About the middle of the nineteenth century Pollender as the first, and a little later Davaine and Delafond, proved conclusively that anthrax bacilli occurred in every case of anthrax but did not prove it to be alive or even the cause of the disease for another substance, living or dead, might be transferred with the suspected organism and so prove later to be the cause of the disease. Hallier had attempted to overcome this difficulty and others no doubt described detritus of organic and inorganic material, fat, crystals, etc., as living microorganisms and as the cause of the disease. Von Recklinghausen in 1871 had proved, by use of alkalies, by acetic acid and glycerine, that certain bodies found in certain diseases were organic; Waldeyer had demonstrated bacteria in the heart in pyemia and in the kidney in pyelonephritis; Weigert similar bodies in the skin in smallpox; and Klebs in wounds, fistulae, diseased bone marrow, diphtheria, etc. Klebs and Billroth, however, had made matters worse by declaring that many different diseases were due to the same microorganism, a coccobacterium.

Up to this time, none of the modern methods of investigating bacteria had been developed. The methods for obtaining pure cultures were highly unsatisfactory, for example; by dilution (Pasteur and his predecessor, F. Cohn); by "fractional cultures" (Klebs); and by a capillary pipette method (Salomonson). Cultures on solid media (potato) had been used, (Fresenius, Hoffman, Schroter). Several had suggested the use of gelatine (Vittadini, Brefeld, Klebs) but none had used it to obtain pure cultures, a method Koch was about to show Cohn and his associates.

And now we can readily see why Cohn was so delighted to get Koch's letter and to hear that Koch was willing to demonstrate and to prove his assertions.

ANTHRAX, THE FIRST UNRAVELLED INFECTIOUS DISEASE

Cohn spoke to a number of professors at Breslau about the matter and so on April 30, 1876 he gathered together Leopold Auerbruch, the physiologist, Julius Cohnheim, the pathologist (to whom Ludwig sent Welch when Welch had planned to go to Virchow), his assistant Karl Weigert, Paul Ehrlich, Weigert's cousin, Traube, and others. Cohnheim, delighted with such a three day demonstration said, "It leaves nothing more to be proved. I regard it as the greatest discovery ever made with bacteria and I believe that this is not the last time that this young Robert Koch will surprise and shame us by the brilliancy of his investigations." Saying this he rushed off to his own laboratory, called his assistants together, told them to drop everything and hasten to hear Koch.

Bringing with him some preparations and his own apparatus, Koch had cultivated before them the anthrax bacilli in pure culture, stained them with Weigert's dyes (discovered in 1871, 1875), demonstrated the bacilli developing from spores in the aqueous humor of the eye of an ox (see Corner), and growing into long chains, inoculated animals and, in the words of Henle, demonstrated the bacilli constantly in the contagious material, isolated them from it and tested their strength. In this way he traced for the first time the life cycle of a bacterium and made the first conclusive demonstration of the relationship of a microorganism to an infectious disease. His audience was delighted, and Koch hurried to Berlin to submit his findings to Virchow, but the great man received him coolly, which naturally depressed Koch. The article of forty pages, breaking Koch's silence of ten years, appeared in Cohn's *Beitrage zur Biologie der Pflanzen*, and stands today as one of the classics of medicine. After over half a century the facts remain as Koch presented them. Do not forget that all this came out of the office of a man in private practice, where he must needs see patients, where for the first time a practical method for obtaining germs in pure culture was worked out, furnishing really the key to unlock the problem of the infectious diseases.

He was probably never happy away from his corner laboratory and *Nunquam otiosus*, never at leisure, placed on his prize essay, could be used for the rule of his life. In November, 1877, he again appeared in print. In this article he emphasized the value of photography in the description of bacteria (his uncle in Hamburg being an expert photographer), described how to make films of bacteria on cover-slips, borrowing the fundamental idea from Ehrlich, how to stain them with Weigert's aniline dyes, and how to stain flagellae, thus proving their previously disputed existence.

Welch recalls the frequent visits of Koch to Cohnheim's laboratory in the summer semester of 1877, and the insistence of Koch upon the use of photography to replace description of bacteria. Welch and Salomonson were the only foreign students, and while Welch worked on edema, Cohnheim had Salomonson inject tuberculous material into the anterior chamber of the eye of rabbits, an experiment now classical.*

About this time Paul Bert opposed the conclusions of Koch but Pasteur, the grandfather of bacteriology, attracted by Koch's work on anthrax, himself, as he said, a stranger to human infectious diseases, repeated Koch's work, confirming it in every particular. Pasteur had himself obtained one organism in pure culture from a septicemia in animals for it was in pure culture in the blood.

FURTHER WORK IN BACTERIOLOGY

The following year (1878), Koch published his third important communication, dealing with wound infection in animals, analogous to surgical wounds in man, in which he reviewed the previous knowledge of the condition, describing how he produced in animals conditions analogous to septicemia, pyemia, gangrene, erysipelas and finding them always due to microorganisms, noting that the various animals differed in their susceptibility to different germs, demonstrating that one of the best ways to obtain pure cultures was by repeated animal inoculation and showing what great aid the Stevenson oil immersion lens and Abbe condenser contributed in such work. In 1878 he attacked the views of Naegeli, who believed in the instability of bacteria both in regard to their pathogenic properties and to their morphology. At this time Koch began to long for a larger laboratory, for he was a born experimenter and needed expensive apparatus to carry on his various researches.

In 1879, his friends having procured for him the position of city physician, paying him 1800 marks a year, Koch moved his family to Breslau but remained only three months due, possibly, some say to too little practice and too small funds, and probably to too little time for study and experimentation. His position at Wollstein, paying him annually but 900 marks, had been held open and his old friends and patients received him with open arms.

He lived in Wollstein in a ground floor apartment, consisting of four spacious rooms, a kitchen and a hall used as a waiting room. His large office was divided by a curtain, and part used as his laboratory, for he never lost his interest in natural history. He used a closet as his dark room and on a table were found the glass vessels for the experimental animals and his photographic apparatus. His wife, three years younger than he, an excellent housekeeper, helped him in his social duties and in his practice, receiving and questioning the patients before letting them see Koch, and aiding him in an understanding manner in his researches, directing the light for photographs, feeding, caring for the living and burning the dead animals in the stove in the room. Their only child, a daughter, Gertrude, born in 1868, Koch loved tenderly. He would play with her and her little friends, at times pretending to be a lion, crouching on all fours and roaring. Later he would answer patiently all her questions, have her sit by his desk and help her with her studies or go walking with the family and the dachshund. A letter in a light vein to her on her eighth birthday tells her how delighted he is to hear she is doing so well, that he expects her soon to help him in his work, to relieve her mother, so that before long they can sit resting in their chairs while she does everything for them. It was with a heavy heart that he left Wollstein and his friends in 1880 to go to Berlin where he felt a field of wider usefulness lay before him.

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* A delightful description of that summer semester was written by Salomonson for Ehrlich's Festschrift. See *Berl. klin. Wchnschr.*, 51: 485–490, 1914.

THE IMPERIAL HEALTH OFFICE IN BERLIN

In July, 1880, Koch began work with the Imperial Health Office in Berlin, where for some time bacteriology had been at a low ebb. He had assigned him such associates as Gaffky and Loeffler. He had always worked alone and greeted the two young military physicians who were to be his associates with inborn shyness. He had, at first, little for them to do but they were fine chaps after his own heart, industrious, conscientious, loyal, as eager for work as he. He could not resist them and soon they worked closely together while Koch astonished them almost daily with new bacterial revelations. Later surrounded also by Gaertner, Proskauer, Wolffhuegel, Huppe, B. Fischer, he began what we might call the Golden Age of Bacteriology. Koch himself referred to it as a period when the gold lay upon the surface, and all that one had to do was to pick it up, but one had to distinguish what was gold. In September, 1881, fourteen months after his arrival in Berlin, appeared the first volume of the Communications from the Imperial Health Office in which Koch made what is considered by many to be his greatest contribution to bacteriology, his poured-plate method of obtaining pure cultures from mixtures of germs. Gelatine, containing meat-infusion, which solidified on cooling, was gently heated until liquid, inoculated with the mixture and then, after shaking, poured into a sterile dish where it cooled and hardened. Simple as this now seems to us none up to that time had been able by any simple method to get a pure culture from mixtures save as Koch had shown by animal inoculation. It is said that Koch got the idea from observing on a piece of cut potato, left by accident on the laboratory table over night, many different colored specks which on examination proved to be pure cultures of germs; but what is more likely is that he simply changed the older method of dilution by adding enough gelatine to the culture media to solidify it on cooling. Cultures on potato were also described. This method of obtaining pure cultures has never been improved, and only the complicated method of Prof. Barber of Kansas, who picked up single germs and then grew them, has ever added anything to the problem. Immunity problems, disinfection, sterilization, sanitary control of milk and meat were also discussed. Indeed this, with the second volume, might be called the cornerstone of the science of bacteriology. It laid also the foundation for aseptic surgery. But even at this time, Koch had clearly in mind that some diseases might be due to microorganisms other than bacteria.

This publication marks the close of the first period of Koch's scientific work, at the beginning of which he found bacteriology in a chaotic condition and at the end (1881) left it, largely through his efforts alone, a well-organized science, based in part upon his four postulates for connecting etiologically any bacterium with a certain disease. Not only the broad principles, settling once for all time the germ theory of disease but also the little details of technique, the knacks which change failure into success, were largely due to Koch's great ingenuity. The first four years of his residence in Berlin were almost the greatest in the history of infectious diseases (Welch). A master had arisen and bacteriology was now a medical science.

WORK ON TUBERCULOSIS

All those who knew Koch intimately were aware that no subject interested him as much as tuberculosis. Cholera, bubonic plague and other pestilences, he said, carried off their hundreds, even thousands, but tuberculosis claimed as victims in all civilized countries its ten thousands. His practice in Posen had taught him that few families escaped. In fact, he was so impressed with the importance of tuberculosis that throughout his life, even to the very end, he let no opportunity escape to work upon this problem. Koch was ever intensely practical, always keeping clearly before him the practical application of his discoveries. This tendency no doubt had much influence in determining what problems he would investigate. Once, in reply to a direct question why he did not take up the study of cancer, he said, "I must protect myself, There is nothing in it."

In the summer (August) of 1881 with the first volume of the Communications safely through the press, he turned his attention to tuberculosis stimulated by the many failures of the leading scientists of the world.

TUBERCULOSIS AND HYGIENE BEFORE KOCH

It is necessary, in order for us to grasp the significance of Koch's work to know something of the ideas in existence at that time concerning hygiene and tuberculosis.

The germs of anthrax, malignant edema, gonorrhea, relapsing fever, leprosy, pneumonia, typhoid, glanders and staphylococci, streptococci, and the malarial plasmodium had all been discovered. You will recall that Joseph Leidy of Philadelphia in 1849 had placed bacteria among the plants and that Prof. John K. Mitchell, father of Weir Mitchell, had been one of those who believed in the germ theory of disease. But the germ theory at this time maintained that the germ was not superimposed upon the patient and independent of him; it was something belonging to him and borrowing from him a sort of pathological vitality and ability to transport it elsewhere. The idea of a living virus, capable of being cultivated and modified outside the body was new with Pasteur.

No work relative to obtaining a good milk supply had yet been undertaken. That flies could transport anthrax germs had been shown but their relation to other diseases had not been suggested. Filtration of water was used in America by 30,000 persons in 1880 and today the number must be nearly 50,000,000. The first hygienic institute, that of Pettenkofer in Munich, opened in 1878; the first in America in 1884 at Bellevue Hospital where Welch had inaugurated his bacteriological laboratory in 1878, while Prudden began his at the College of Physicians and Surgeons in New York a year later. Both had been pupils of Koch. The bogey of carbonic acid gas in regard to ventilation was still at this time in the minds of many sanitarians, and most houses were heated by stoves and hot-air furnaces.

It is Koch's work on tuberculosis that interests us chiefly, and for us to grasp its significance we must know something of the ideas in existence at that time concerning tuberculosis.

Jerome Fracastor, the founder of the germ theory of disease, in 1546, wrote:

> Nothing further than contagion is necessary for the origin of phthisis, which may attack a person who has never had catarrh, who has not ruptured a blood vessel, or has an ulcer about the chest, or who has not had a pleurisy or any other malady, but has been perfectly well. He may contract it by habitual intercourse or a life in common with a phthisical patient, or by fomites (contaminated objects). For it is astonishing how tenacious and for what a long time the virus will live in fomites; we have seen the clothes which a consumptive had worn to give the contagion after two years; indeed, the bedrooms, the beds and the flats (?) in which the patients have died, may do the same.

The Italians and the Spanish were both convinced in the eighteenth century of the contagiousness of phthisis and required that the bed and belongings of anyone dying of the disease should be burnt. Morgagni refused to perform autopsies on phthisical persons. But in the north such views did not hold. You may recall that Sauvages in France described twenty varieties of phthisis and Morton in England sixteen but that Laennec preached the unity of phthisis, and believed that all the changes in the lungs in pulmonary tuberculosis arose from the tubercle. Louis upheld Laennec. Klencke later, in 1843, showed that tuberculosis might be transmitted by cow's milk. But many combatted these ideas, and among them none was more commanding than the great Virchow who held that tubercles had no connection with the cheesy matter so common in pulmonary tuberculosis (caseous tuberculosis), and that the cheesy degeneration might follow a variety of causes. Niemeyer even went so far as to say that the worst thing that could happen to a consumptive was that he might become tuberculous. Virchow opposed all specificity in disease. The influence of Broussais, not Laennec, was strong in Germany. Heredity at this time was considered the most important factor in tuberculosis and in such unfortunates cold, humidity, dust, among other things, might bring about the disease. But no germ had yet been proved to cause the disease though many accepted such a view. In a few years, however (1865 and 1868), Villemin proved that "tuberculosis is the effect of a specific causal agent, of a virus," and that dried sputum was important as a source of the disease. His book is a model of scientific writing, but none is so difficult to convince as the self satisfied, and even the definite proof of Villemin's contention, brought forward by Chauveau, Edwin Klebs, Gerlach and Cohnheim, failed to settle the problem for such doubters as Colin, Chatin, Virchow. Cohnheim predicted, however, that soon someone would find "tubercle particles," as he called them, in the tubercles and in the cheesy matter. Stimulated by this, many set out at once to work on the problem, and in 1877 Klebs announced that he had found the cause of tuberculosis; Toussaint and Aufrecht did the same in 1881; and Baumgarten in 1882 made a similar claim. While it is probable that Baumgarten did really see the tubercle bacillus, he was unable to stain it or to produce convincing proof of his belief. At this time Bodington had passed into forgetfulness and Brehmer and Dettweiler had ushered the treatment of pulmonary tuberculosis into the sanatorium period. There was as yet no sanatorium in

America but shortly Trudeau was to lay the foundation of his on a bleak hillside. As the question of contagiousness was not settled, no sanitarian dared suggest any sanitary regulations concerning tuberculosis. There was no fumigation, no sterilization, no spitting ordinances, no tuberculin for diagnosis. Brehmer was still exercising the "small hearts" of his patients, and Dettweiler was advocating rest in the open. All was still empirical. Forlanini had begun to think of artificial pneumothorax but had not yet dared to practice it. The diagnosis of pulmonary tuberculosis had not advanced much beyond the state that Louis left it in the early part of the century. Epidemiology and prophylaxis were unborn.

THE DISCOVERY OF THE TUBERCLE BACILLUS

You will recall that Koch was said to have really begun his attack upon tuberculosis as a public health problem in the summer, probably in August, of 1881, and when spring was but three days old in March (24) 1882, six months later, he had satisfied himself that he had solved the problem. Up to this time he had been his own severest critic. On March the 24th, a damp, cheerless evening, he presented his data and conclusions before the Berlin Physiological Society, a small but influential body, where frank discussion was the rule and rising ambition was often none too gently treated. The society met in du Bois-Reymond's physiological laboratory, in a room now shown with just pride to visitors. This proud marble building on the banks of the Spree was the scientific home of two of the great lights of the University, Helmholtz and du Bois-Reymond. Virchow had been invited to a private demonstration in the afternoon but had not come. The large central table about which the chairs were gathered was covered with specimens (some say 200) and microscopes. The room filled. There was a hushed expectancy. Greetings were whispered. DuBois-Reymond sat chatting with Helmholtz. The opposing factions were present, those who believed in the infectiousness of phthisis and those who did not; those few who followed Laennec, those many who held with Broussais. Some recalled how Virchow, the professor of professors, had remarked upon the youthfulness of the work emanating from the Health Office. Koch meanwhile played with the micrometer screws of the microscope. Then du Bois-Reymond who presided, opened the meeting. Koch came forward, adjusted his papers and began his address in a manner suggesting some nervousness, some embarrassment, for here in his maiden speech in Berlin, he had to face the greatest in medicine in Berlin. After a short time he regained control of himself and was then the cool experimenter as always. His voice as he proceeded raised in pitch, his face became red, and his favorite expression "no loose ends" came to his mind. The audience listened with breathless excitement and when towards the end he began to draw practical inferences concerning antituberculosis work they recognized his sober common sense. They saw come true the dream of Henle, the prediction of Cohnheim. That night when the speaker, flanked by Gaffky and Loeffler, finished reading his devastating communication, all eyes sought the great Virchow who had combatted the idea that caseation might be due to tuberculosis; but like some of the other leaders in medicine and surgery he was absent. "That evening remains graven in my memory," wrote Ehrlich later, "as the most majestic scientific event in which I have ever participated." Koch's picture, with those of the Kaiser, of Bismark, of Moltke, was printed on red handkerchiefs of which 100,000 were sold. Verses were written to the "bacillus-father" Koch and printed in *Kladderdatsch*.

Koch's paper* was published Monday, April 10, 1882, in the *Berliner klinische Wochenschrift,* seventeen days after it was presented.

Now Koch immediately began looking for the cause of the disease in tuberculous tissue, the usual method of procedure, employing the ordinary stains or dyes, but he failed. Then, remembering that some bacteria stained better when the dye was slightly alkaline, he added potash to his methylene blue and saw, after counterstaining with vesuvin, a brown dye which decolorized everything save the bacilli, very thin rods still blue in color, 1/10,000 of an inch long and one third as wide. I can picture Koch with hands colored like a rainbow, shriveled from acids, as hour after hour he stains coverslip after coverslip, 100,150, and then only was he able to show Gaffky, who possibly timidly entered the room to announce that Frau Koch was awaiting the Master, some long, thin blue rods. He imagined that they were the bacilli. Efforts were redoubled. Hospitals, slaughter-houses, zoological gardens, were haunted, and finally Koch was satisfied. He had found the tubercle bacillus and had proved as much as he could by staining.

Though time and again he had found these tiny rods he recalled his teacher Henle's requisite, what is necessary to connect in a causative way a germ with a disease, he attempted to grow them on various substances (media) but failed until he coagulated the blood serum of cattle and used it for growing germs. I can see him going morning after morning to the incubator, five days, six days, seven days, nine days and still no growth as he examines with his lens the many tubes he has inoculated and returns them disappointedly to the thermostat. And then on the tenth day, possibly as rumor has it on the fifteenth to the twentieth day when he is ready to discard them as showing no growth, I can picture him going to the incubator with grim determination and I can see his face light up. What are these little specks and white scales? Koch was never a demonstrative person, and yet an expression of pleasure and triumph must have spread over his face as he saw what he felt sure were the growing tubercle bacilli. He had at last grown the germ, and he carried them later through seventy generations. With the germ so to speak in hand, he attempted to "test its strength," as his old teacher Henle said was necessary. Again and again he reproduced the disease in all types of animals. He finally grew the germs again from the animals and he had fulfilled all the conditions necessary. To accomplish such an amount of work in such a short time as six or seven months, especially when the slow growth of the tubercle bacillus is taken into consideration, seems incredible, and Theobald Smith and Petroff frankly think it highly unlikely.

There is a limit to the length of any article prepared for presentation to any society and I have often wondered whether this was not the cause of the omission of the names of some workers from whom Koch borrowed ideas. However this may be, in this article he traced for the first time the etiology of tuberculosis and if he were a little dogmatic in doing so, I beg of you to think of the dogmatism of some of his hearers. Possibly it was Virchow's influence which forced Koch to present his paper before a physiological instead of before a pathological society where it belonged. It is possible, of course, that Virchow, opposing the idea of the specificity of disease and realizing that any paper presented before a society over which he presided might be inferred to have his sanction, suggested that as Koch replaced a physiologist in the Health Office it would be more fitting for his paper to be presented where it was.

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* A translation by the Pinners has recently been published by the *American Review of Tuberculosis,* 1932.

How the news of the discovery came to America is interesting. Very early on the morning of April 3, 1882, a very much excited elderly man with greying hair and the sideburns typical of the practitioner of those days, rushed into the bedroom of a much younger man, a great student, a reader into the wee hours of the night, and awakened him waving the morning paper and shouting, "I knew it, I knew it, I knew it!" In this way Austin Flint, probably the greatest clinical student of tuberculosis that America has yet produced, a firm and one of the few believers in the contagiousness of phthisis in America, informed Professor William H. Welch of the discovery of the tubercle bacillus. On that same morning my earliest medical recollection takes me back to a dining room where I heard the family discuss and read in the *Sun* paper the headlines of the cablegram describing how a German had discovered the cause of consumption. And so Koch the scientist became Koch the world figure.

The Atlantic cable to America had been in existence for nearly thirty years and yet the first news of a discovery, far more important for mankind than any political news, reached New York only on April 3, ten days after Koch had read his paper which, however, was not published in the *Berliner klinische Wochenschrift* until April 10. It appears, however, that Koch had sent a copy of his paper to John Tyndall in London who recognized at once its significance and wrote a letter calling attention to it in the *London Times* which was published on April 2. A cable announcing the discovery was published in the *New York World* on April 3, and it was this paper which Flint waved before Welch. Probably the first mention of it in an American medical journal was an editorial notice in the *Medical News* of April 20 (Landis).

Sternberg, later Surgeon-General of the U. S. Army, demonstrated and photographed in 1882 at Fort Mason in California the tubercle bacillus but it is certain that both Welch and Prudden had stained it previously (early in May, 1882) in New York City. Prof. Welch writes:

> As soon as Koch's method of staining the tubercle bacillus reached this country, I applied it successfully and demonstrated the bacillus to Austin Flint and others and taught it to the class. This could not have been later than early in May, 1882. Ehrlich's method which was published not long after Koch's paper, was a great improvement and I used this and later Ziehl's carbol-fuchsin, as everyone else did, in preference to Koch's. I think Prudden was doing the same

thing at his laboratory at "P and S." I do not know that any one else preceded us in staining the tubercle bacillus and demonstrating them to others in this country. Sternberg in California could not have learned the method earlier than Prudden and I on the Atlantic Coast. It was no great trick to stain the bacilli and I had many visitors to my laboratory at Bellevue who came to see them.

Landsteiner told me recently that Ehrlich's tubercle bacilli stain was already in use by Ehrlich for *Mastzellen* before Koch's paper was published on April the tenth. It was always a mystery how Ehrlich came out so quickly with his method and Landsteiner's statement explained the mystery.

H. M. Biggs wrote in his graduation thesis presented before Cornell University in June, 1882:

> Within the last month there has come to us across the waters from Germany the announcement of what promises to be the grandest discovery of the age, the discovery of a parasite as the cause of tuberculosis by Dr. Koch of Berlin. Professor Tyndall in an article upon this says, "if the seriousness of the malady be measured by the number of victims, then the most dreaded pests that have ravaged the world—plague and cholera included—must stand far behind the one now under consideration.

Biggs had completed his undergraduate work at Cornell in two and a half years and had gone to New York to begin his study of medicine. He later writes:

> How clearly I recall the incident which directed my thought to bacteriology and tuberculosis. I was in the last year of the medical school. Our beloved friend, Dr. Welch, was professor of pathology at Bellevue and was conducting a private class in normal and pathological histology. I was a member of one of those classes just after the publication of Koch's classical work on the Etiology of Tuberculosis. In his most lucid and fascinating manner he told us of this great work and of its significance in the future development of medicine. He showed us the methods of staining sputum and demonstrated the tubercle bacillus.

Austin Flint at this time "wished to institute a systematic examination of the sputum of all cases of tuberculosis which came to the hospital. I was junior assistant at the time," writes Biggs, "but fortunately for me, neither the house physician nor the senior assistant could find time for this work and it fell to my lot to do it." They concluded that when the tubercle bacillus was present it meant pulmonary tuberculosis but its absence on one occasion meant little. The report of the Committee on Practical Medicine and Epidemiology of the Illinois State Medical Society concluded that the tubercle bacillus was probably only one of the mere accompaniments of certain deteriorative changes in organic matter and possessed no causative relation to tuberculosis whatever, basing their opinion on the asserted fact that physicians and nurses caring for the tuberculous suffer no greater mortality from tuberculosis than others. Consequently, they continued, it is unnecessary to quarantine the victim of tuberculosis, to disinfect his sputum or to hope by the use of germicide to cure him. Loomis refused to accept Koch's discovery at the College of Physicians and Surgeons in New York but Austin Flint, who had written, "The doctrine of the contagion of the disease has now as hitherto its advocates, but the general belief is in its non-communicability," accepted it immediately.

Replies to Doubters

It is difficult for us to comprehend how any one could doubt Koch's logical and convincing conclusions in regard to the etiology of tuberculosis, but some did, and in 1883 we find Koch answering sarcastically some of his critics. He deals first with the American skeptics, mentioning Ephraim Cutter, who thought the tubercle bacilli were "babies" of the acetic acid bacteria; R. R. Gregg, who suggested as an explanation of Koch's "mistake" that the supposed bacilli were bits of fibrin formed in the tubercle; Schmidt of Chicago, who could not stain the bacilli and so thought no one else could; Formad of Philadelphia who thought the tubercle bacilli were superfluous as he could diagnose tuberculosis from the scrofulous tissue; Sternberg who at first could not find the bacillus and who, Koch hoped, would soon recover from his error. He is more surprised at his German critics. Beneke got similar bodies when he treated blood cells with an alcohol-ether solution and stained them. Cramer claimed to have found bacilli staining like tubercle bacilli in the stools of twenty sound persons; but Gaffky could not confirm the observation and it was possible that Cramer did not decolorize his preparations properly. Schottelius found tubercles in the lungs after the inhalation of many different substances but did not try further injections of these tubercles which of course were foreign particle tubercles. Dettweiler found the tubercle bacillus in the sputum of eighty-seven patients almost without exception, but held them to be an accompaniment and not the cause of tuberculosis. Injection of these bacilli into animals never produced such lesions as he saw in his patients but always a miliary lesion, and so he inferred they might not be the cause of the disease in man, while other and various bacteria which he saw in the lesions he suggested might be the causal factor. Koch asked why he had his patients spit into a solution of corrosive sublimate, and Dettweiler answered, to satisfy the over squeamish. Koch called to his attention how the malignant pustule of anthrax in man differed from the disease in animals. Spina attempted to repeat Koch's work but failed and Koch doubted if he ever worked with pure cultures.

[*To Be Continued*]

BIDLOO AND COWPER, ANATOMISTS

By FENWICK BEEKMAN, M.D.

NEW YORK CITY

WHEN William, Prince of Orange, crossed from Holland to reside in England in the year 1688, he was accompanied by a large retinue of servants, followers and advisors. Many of these he retained in his service following the proclamation of February 13, 1689, which made him and his wife, Mary, co-rulers of England. Though but thirty-eight years of age, William III was in poor health and required the constant supervision of a physician. The physician whom he chose to accompany him on his journey to his new country was Godfried Bidloo.

Bidloo was born in Amsterdam in 1649. We know but little of his early life; it is said that in his youth he was interested in literature and had written plays. He did not, however, continue for long in these pursuits, for we next hear of him at the age of twenty-one (1670) becoming apprenticed to a surgeon and studying at The Hague under Frederik Ruysch (1638–1731). Ruysch was a well-known anatomist, was thoroughly trained in dissection and prepared many beautiful anatomical specimens. He had acquired the skill of injection from Jan Swammerdam (1637–1680) and had applied this talent to so great an extent that his specimens were known throughout Europe for their artistic merits. Garrison[1] tells us that "for whimsical originality and exquisite delicacy of details, the plates drawn by Frederik Ruysch deserve a special mention." Having studied under the supervision of so inspiring a teacher, it is probable that young Bidloo made up his mind to follow as quickly as possible in his Master's footsteps. It must, therefore, have been soon after finishing his studies with Ruysch that Bidloo laid his plans to produce an atlas of anatomy that would eclipse all others that had been previously published, from the standpoint of originality and artistic merit of the illustrations. Thus his magnum opus finally appeared in the year 1685, under the title of "Anatomia Humani Corporis." But let us, before we describe this work and the consequences that followed its publication, continue our story of the life of Godfried Bidloo.

Having terminated his studies with Ruysch, Bidloo practiced medicine and surgery and served in the army, also finding time to travel in France and Germany. However, he was not contented to continue in practice without holding a degree for we find him in the year 1682 registered as a student in the University at Franeker,[2] from which he obtained the degree of "Medicinae Doctoris & Chirurgi," having presented a thesis entitled "Variae prolusiones Anat. Medicae" (1682). Little is known of what occurred during the next six years of his life except that he returned to Amsterdam but it may be presumed that, following the completion of his book on anatomy in the year 1685, he again joined the army which was fighting the French under Louis XIV in Flanders. It may have been at this time that the attention of Prince William of Orange, who was leading the Dutch armies, was first attracted to the young surgeon.

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[1] History of Medicine. Ed. 4, Phila., Saunders, 1929, p. 251.

[2] The University was suppressed by Napoleon I in 1811.

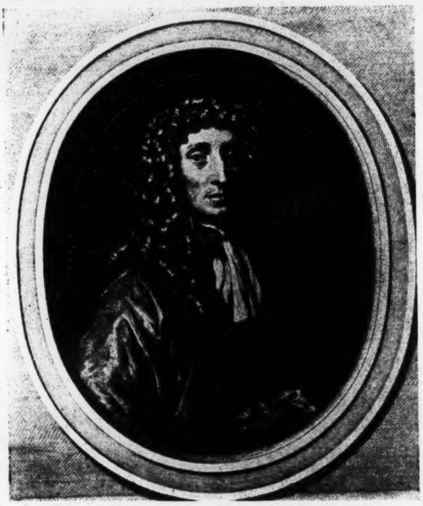

FIG. 1. GODEFRIDUS BIDLOO (1649–1713).

Bidloo was appointed Professor of Anatomy at The Hague in 1688, as successor to Anton Nuck, but left soon after to accompany William to England for we find, according to Macmichael's "Goldheaded Cane," John Radcliffe in consultation with Bidloo and Dr. Thomas Lawrence in the autumn of 1689, when William III was suffering from one of his periodic attacks. He was a favorite of William but this did not prevent the king's advisors, Bentinck, later the Earl of Portland, and Zulestein, who became the Earl of Rochford, from calling upon English physicians when they thought that the condition of His Majesty's health required. Though Radcliffe differed radically in his opinion on the treatment to be prescribed for the royal patient, the meetings between the doctors appear to have been usually amicable. This may seem strange for we find that Bidloo was difficult to get along with and had many acrimonious controversies with others over situations which were of far less importance than that of the care of the health of a king. It is probable, however, that Radcliffe, who is known to have been rough and to have possessed an inflammable temper but could be diplomatic when the need arose, refused to enter into controversies of a personal nature.

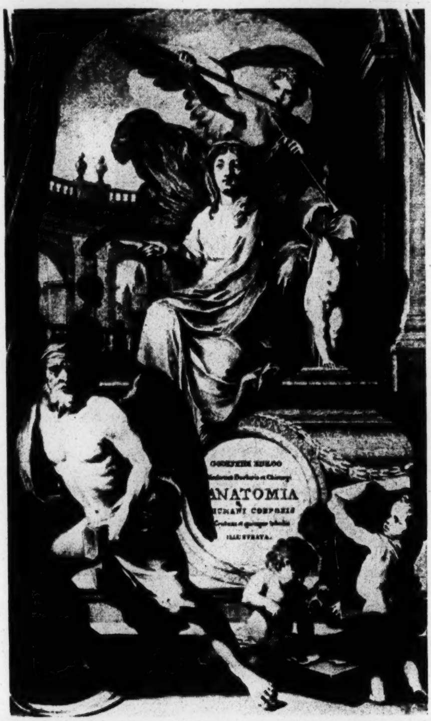

FIG. 2. ALLEGORICAL TITLE PAGE FROM BIDLOO'S ANATOMY (1685).

In 1690 Bidloo returned to his native land, having been appointed by William III general superintendent of all civil and military hospitals of Holland. Two years later he was arrested for having published a pamphlet[3] which caricatured some judges of Holland, but he was finally freed following repeated requests from William, so that he could accompany him to Flanders where further military operations were in progress. The following year, 1693, the King appointed him inspector of military hospitals in England and, in 1694, he was given the professorship of anatomy and surgery at Leyden.[4] From now on he must have been frequently associated with Herman Boerhaave (1668–1738), who was at this time giving to Leyden the lustre that made that University so famous in the seventeenth century. Bidloo, however, had little time to teach for he was much in England and, in 1696, the Board of Managers of the University severely criticized him because of his failure to lecture.

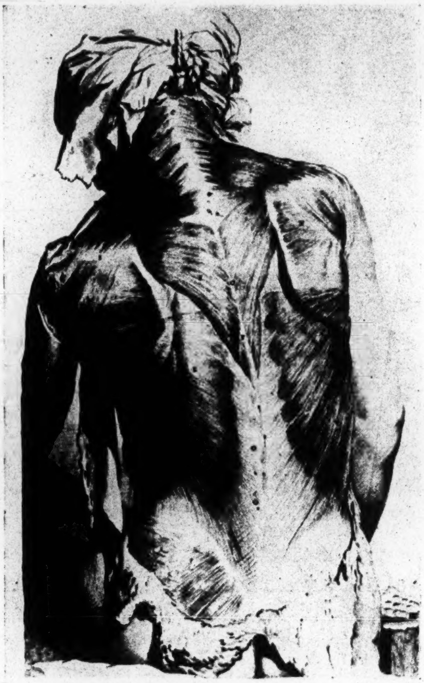

FIG. 3. PLATE FROM BIDLOO'S ANATOMY, SHOWING MUSCLES OF BACK.

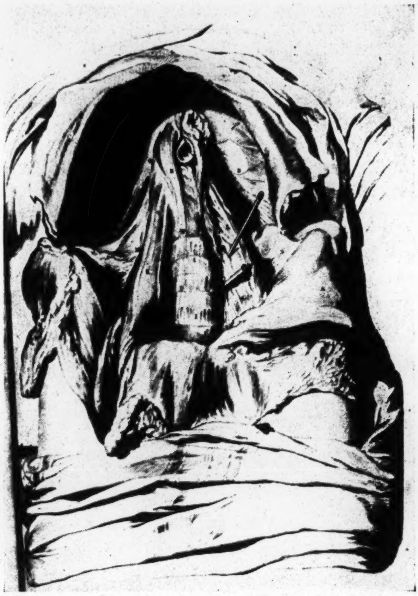

FIG. 4. PLATE 52 FROM BIDLOO'S ANATOMY; AN EXEMPLIFICATION OF THE ARTIST'S EXACTNESS TO DETAIL, FOR EVEN A FLY IS PICTURED IN THE ILLUSTRATION.

In this year Bidloo became involved in a quarrel with his old master, Frederik Ruysch, who had, with justification, criticized some of the illustrations appearing in Bidloo's atlas of anatomy. The latter retorted with his pen in a rude and caustic manner.[5] James Atkinson (1759–1839), speaking of this incidence, says:

> This old Ruysch was a formidable competitor and not to be so easily extinguished as any common rush-light, or farthing candle. So we may not much doubt that Bidloo, with all his splendor as an anatomist, had not been famous in his day, for an overabundance of milk of human kindness, in his Receptaculum

[3] Beurzestryd of saemensprook tuschen Galenus en Baldus.

[4] "Dissertatio de Antiquitate Anatomes . . . ," being the title of his inaugural address.

[5] Vindiciae quarundam delineationum anatomicarum contra animadversiones Friderici Ruisch.

Chyli. It is fair, however, to pay considerable respect and attention to his Vindiciae, in regard to his answer to Ruysch and Cooper.

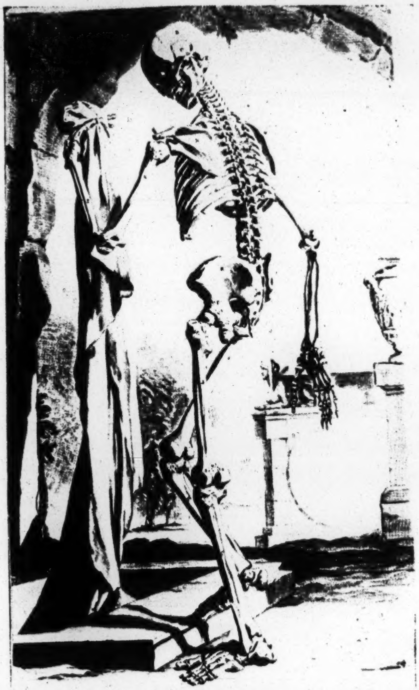

Fig. 5. This Plate Shows de Lairesse's Artistic Tendencies.

Bidloo remained in England from 1700 to 1702 in attendance upon the King, who died during the latter year. Soon after his return to Holland he published a monograph upon the last illness and death of William III.[6] This pamphlet contained much controversial matter and through its publication he added to the number of his enemies. He now settled down in Leyden and devoted himself to teaching and writing. It was toward the end of this period that Albinus (1697–1770) became his student. The year 1708 saw the publication of two lectures which were dedicated to the Royal Society, in which the author rejected the theory that the nerves contained fluid and showed that they were composed of numerous delicate fibers. Bidloo died at Leyden in the month of April of the year 1713. Two years later his papers were collected and published.[7]

Fig. 6. William Cowper (1666–1709).

The character of the man is of interest. There is no doubt that he was of an ambitious and aggressive type, having high esteem of his own abilities. That he had ability there is sufficient evidence, but he was prone to seek his advancement through the influence of others who could give him favors, rather than by means of hard work. He neglected his duties as Professor of Surgery and Anatomy at The Hague and was criticised for his lack of attendance in teaching at Leyden. During these periods he was accompanying his benefactor, William III, from whom he had evidently received these positions. Haller, however, implies that his mode of life was not above reproach. "Vitae liberiori plura tempora dedit quam studiis."[8]

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[6] Verhaal der laatste ziekte en van het overbyden van Willem III.

[7] Opuscula omnia anatomico-chirurgica edita et inedita. Leyden, 1715–1725 in 4° with illustration.

We cannot rank Bidloo as an outstanding anatomist or physician, but his anatomic atlas is sufficient testimony to place him in a position of authority on the subject of anatomy for the time in which he lived. As a physician his position was such that his judgment was respected, though many times it was swayed by his personal feelings.

> With King William came the famous Dr. Bidloo as chief physician; . . . It was said, indeed, that Bidloo, who was otherwise expert in the knowledge of physic, and knew how to prescribe proper medicaments when he hit upon the distemper, from frequently mistaking the nature of English constitutions, subjected those who advised with him to the greatest hazards.[9]

That Bidloo at times appears to have allowed his better judgment to be overruled by his wish to stand favorably in the eyes of the King, we have evidence.

> King William died in 1702. The year before this event, Dr. Bidloo had accompanied His Majesty to Holland, where his treatment of his royal patient at that time, and for some months before his death, was a subject of animadversion with the doctors attached to the court. In addition to many other infirmities under which the King laboured, he was troubled with boils that formed in different parts of his body; and for these Bidloo directed that his feet and legs should be rubbed night and morning, with flannel covered with powder of crab's eyes, flour, and cummin-seed. As to diet, the Doctor was exceedingly indulgent, allowing His Majesty to drink cider, ale— in short, all sorts of strong beer; and to take crude aliments before going to bed. It was in vain that Doctors Hutton, Millington, Blakemore, and Lawrence remonstrated. On the King's return to Hampton Court, the dropsical swelling of the inferior extremities extended upwards, for which Bidloo prescribed a vapour bath, and inclosed the legs of the patient in a wooden box constructed for that purpose. In a constitution so weak, which this treatment was reported to have still more debilitated, an accident was likely to prove fatal.[10]

Bidloo's greatest faults were his pugnacious dogmatism and unwillingness to accept criticism, though it was justified. All his controversial writing shows up his jealous, impetuous disposition. Any criticism on the part of others brought from his pen caustic answers, written in scientific Latin or Low Dutch. These publications did not hold to the facts of the case but were interspersed with aspersions concerning his adversaries' character and the calling of names. Ruysch, whom he attacked with vehemence, had been his Master, had taught him all that he knew of anatomy and had instructed him in the methods used in preparing anatomical specimens. Bidloo's defense, in this instance, should have at least been free from rancor toward one who had launched him upon his career. The publication concerning the last illness and death of William III, a defense of Bidloo's actions, is filled with vilifications directed against the physicians who were in attendance with him in the care of His Majesty. It was "written in Low Dutch, in order, as his enemies said, that few might read it in this country" (England).[11] This pamphlet embroiled him in a controversy with the French surgeon M. Ronjat, who had attended the King immediately preceding his death, when he fractured his collarbone. Ronjat retorted by publishing a reply, printed in London.[12]

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[8] Quoted by Biog. Lexikon der hevorragendem Ärzte.

[9] Lives of British Physicians, p. 122.

[10] Gold-headed Cane, p. 15.

We now come to that controversy between Bidloo and Cowper, concerning the rights of the latter to publish his anatomy of the human body. But before we take up the facts concerning this dispute, it would be well to glance for a moment at Bidloo's atlas, "Anatomia Humani Corporis," to find out what manner of book it is.

The volume examined in this study is a large folio measuring 14¼ by 24⅝ inches and weighing approximately 18 pounds. The pages, both those of the text and the prints, are of heavy paper containing the watermark shown in Figure 8. This copy is bound in red morocco which is embellished with the arms of Gabriel Bernard De Rieux.[13]

There is an extra title page which consists of an engraving, allegorical in type, which contains a shield, upon which is inscribed: "Godefridi Bidloo Anatomia Humani Corporis Centum et quinque tabulis Illustrata." This is followed by a second or true title page containing the following details:

Godefridi Bidloo, Medicinae Doctoris & Chirurgi, Anatomia Humani Corporis, Centum & quinque Tabulis, per artificiosiss. G. de Lairesse ad vivum delineatis, Demonstrata, Veterum Recentiorumque Inventis explicata plurimisque, hactenus non detectis, Illustrata. Amstelodami, Sumptibus Viduae Joannis à Someren, Haeredum Joannis à Dyk, Henrici & Viduae Theodori Boom. MDCLXXXV

The third leaf contains a dedication, in Latin, to Prince Casimiro. Following this there is a full page copper plate engraving of Bidloo by Blooteling,[14] from a painting by de Lairesse.[15]

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[11] Gold-headed Cane, p. 17.

[12] Lettre de M. Ronjat, Premier Chirurgien de feu Sa Majesté Britannique Guillaume III.; écrite de Londres à un Medecin de ses Amis en Hollande.

[13] Bernard De Rieux (Gabriel) died in Paris 1745. This copy is described in item 1223 of the catalogue of the sale of his library (Catalogue des livres de la bibliotheque de feu Monsieur le president Bernard De Rieux. Paris, Barrois, 1747) as follows; "Godefridi Bidloo anatomia humani corporis 105 tabulis per Guil. de Lairesse ad vivum delineatis demonstrata Amstel. Vid. à Someren, 1685. in-fol. carta maxima mar.r."

[14] Abraham Blooteling, eminent Dutch designer and engraver, born 1634, visited England in 1672 where he remained for two years. He is noted for his etchings and mezzotints. He died sometime later than 1698. (Bryan's Dictionary of Painters and Engravers.)

[15] Gerard de Lairesse was born at Liege in 1641, son of Renier de Lairesse of some celebrity who had his son instructed in belles-lettres, poetry and music and taught him the principles of design. The boy later studied under Bertholet Flemalle. At the age of sixteen he had made himself known as a portrait painter. As he grew up, however, he became expensive in his tastes and dissolute in his habits, which left him indigent, though his gains were considerable. He settled in Utrecht but soon after removed to Amsterdam where he was considered the greatest historical painter of his time. He lost his sight in 1690, when fifty years of age, and died in 1711. "His style is grand and poetical, he was perfectly acquainted with history and fable, possessed a lively and ready invention and was attentive to propriety of costume. In his compositions and design he has been compared to Nicolas Poussin, but he has very slender pretensions to Poussin's classic elevation of thought, profound acquaintance with the antique, elegance of taste and purity of design. He painted with extraordinary facility and is said to have finished in one day, a picture of Mount Parnassus, with Apollo and the nine Muses, an achievement which Poussin would not have been ambitious of performing. His backgrounds are enriched with

The body of the book is formed of 105 copper plate engravings and an explanatory text. The text is printed upon separate pages and is in Latin. The descriptions that are given of the plates are short and imperfect, for they do not by any means cover the subjects which they are supposed to elucidate. The value and interest of the book is in its beautifully executed plates, which portray the anatomical specimens in nearly life-sized proportions.[16] From the title and preface, we learn that the drawing of these plates was done by Gerard de Lairesse but it is not certain whether he executed the engraving, though most authorities give him the credit. James Atkinson states that they were drawn by de Lairesse and engraved by Blooteling; we know that these artists were responsible for the portrait of Bidloo which is contained in the volume but that is no reason to believe that Blooteling was the engraver of the anatomical plates. "According to Haller the engravings were done by VanGunst."[17] "Moehsen names the brothers Peter and Philip VanGunst as the engravers."[18]

The plates that illustrate Bidloo's Anatomy are original in pattern and artistic in design. The Vesalian era was one in which each new author attempted to outdo its founder in accuracy and beauty of illustrations. Each one, however, clung to the Vesalian pattern and failed to produce the accuracy of detail and the artistic values of the Great Master. In consequence, these illustrations show little originality and are poor in artistic quality, though the art of copper engraving had replaced woodcutting early in the seventeenth century. Bidloo attempts originality by introducing a new style in the pattern of his plates, and he chooses for his collaborator an artist with outstanding ability. Where he fails is that he leaves too much to the imagination of his illustrator who, uninstructed in the science of anatomy, attempts to cover his shortcomings through his ability as an artist. Therefore, from an anatomical standpoint the illustrations are not entirely accurate.

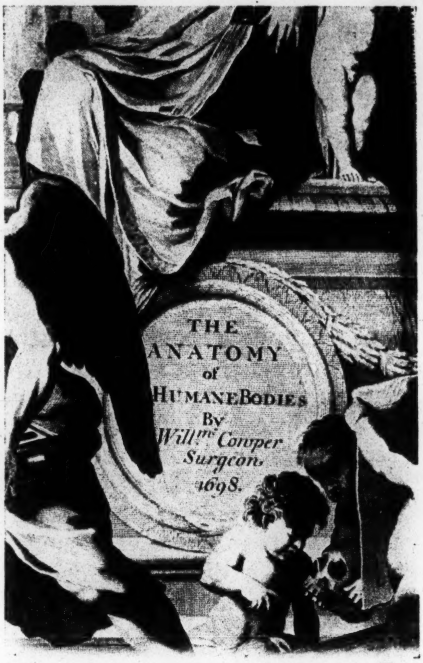

FIG. 7. SHIELD FROM THE ALLEGORICAL TITLE PAGE OF COWPER'S ANATOMY (1698). THIS ILLUSTRATION PLAINLY REVEALS THE OUTLINE OF THE SUPERIMPOSED TITLE OF COWPER, WHICH HAS BEEN PASTED OVER THE TITLE OF BIDLOO'S DUTCH EDITION (1690).

In contrast with these utterly inartistic tendencies Bidloo's plates (1685) seem like a return to something better, and would have represented the very best of

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architecture, the principles of which he perfectly understood." (Bryan's Dictionary of Painters and Engravers.)

[16] Unfortunately none of these plates contains the name of the artist or the engraver.

[17, 18] Choulant, p. 250.

> this period had the anatomist been just as conscientious as the artist, and had the latter himself recognized more fully and valued more highly the true beauty of nature.[19]

Another critic tells us that though the illustrations are artistically valuable, they are less so anatomically, since Bidloo's specimens were not always accurate and the artist's imagination often supplied the parts unintelligible to him.[20]

Eighty-three of the plates show the various parts of the body in progressive stages of dissection. The illustrations portray the cadaver upon the dissecting table with instruments and equipment necessary for the art of dissection at hand. All the details are there, even to a large fly which is depicted in one plate; for it appears that the artist wished to suggest the air of the dissecting room of those days. In an occasional print the body is partly draped with a sheet, but apparently this has been added for effect rather than modesty and in some of the plates tends to confuse the reader. It may be thought, from this description, that the illustrations, because of their reality, may cause offense to those who are unaccustomed to such sights. But, strange to say, they do not in any way offend one's finer senses. For the illustrator, though he portrays the cadaver in a realistic manner, has softened the sense of reality through his artistic skill.

James Atkinson, in defending this work from criticism, says:

> Nor does the imputation of bad drawing and faulty perspective, as has been represented, appear, to my eye, at all chargeable upon the work. On the contrary, they seem to me, in these respects, most particularly correct. Indeed we may say, perhaps, that the excellence of the work consists in this perfection. Neither does the Anatomical part appear in any other light, as far as my perception goes, than as a refined and close copy of nature; nay, it is almost nature itself!

This author continues to say that we should not find fault because the artist included a fly in one of his prints, for flies are accustomed to be found in dissecting rooms, and:

> Does not the portrait painter affect to represent the general and particular costume, and actual existence of surrounding objects; nay, the very Idyosyncrasias of the portrait. Do not these, by association, identify and enhance the value of the likeness. Was the wart on Oliver Cromwell's face placed there as an embellishment? then, why debar the Anatomist of the idioms of his dissecting-room?

On the other hand, John Bell (1763–1820), himself an anatomist of no mean standing and his own illustrator, says this of the book; "Bidloo's tables are beautiful and masterly; but being wanting in regularity and order, they want altogether the clearness of a plan."[21] The reality of the illustrations are commented upon by Bell who, though he has great admiration for the artistic talent expended by de Lairesse, nevertheless considers the plates from an anatomical standpoint to be "all disorder and confusion; and one must be both anatomist and painter to guess what is meant, how the limb is laid, and what parts are seen."[22] But I think all will agree, if they study these plates, that much of this difficulty in orienting the parts as they are illustrated is due to the lack of a proper descriptive text, and the absence of sufficient reference letters upon the illustrations for correlation with it.

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[19] Choulant, p. 34.

[20] Biog. Lexikon der hevorragendem Ärzte.

[21] Bell, J. Preface, p. viii.

[22] Bell, J., Preface, p. x.

Table or plate four is of historical interest as it depicts the skin and hair under magnification. There are also microscopic illustrations in some of the other plates. These are very early illustrations of magnified objects, for Bidloo undoubtedly learned the use of the microscope from his countryman, Antony Van Leeuwenhoek (1632–1723), whom he knew, for he dedicated to Van Leeuwenhoek in 1698 a pamphlet, in which he describes the liver fluke (Fasciola hepatica).[23]

The remaining twenty-two plates consist of three to demonstrate surface anatomy and nineteen of osteology. The three first illustrations portray nude figures posed in gardens; one, the front view of a male subject and two, of a female, front and rear views respectively. There is much accessory design in the pictures which, as Choulant says, is Lairesse's well-known style. Such details as Grecian urns and drapery help to fill the foreground and are as prominently placed as are the large, heavily-framed, undraped, posed figures. The background of the illustrations consists of trees or statues. The perspective is good. I think, as others have stated, that it is unfortunate that the figures are covered with reference letters, as these are hardly necessary to elucidate the plates and detract from the beauty of the illustrations.

The last nineteen plates show the bony parts of the body; plates eighty-seven and eighty-eight portray the skeleton, front and three-quarter rear views, respectively. Here again the artist has returned to the Vesalian style of pattern in his illustrations. He has chosen the tomb for his foreground, through the portals of which the distant hills and houses are seen. But de Lairesse pays too great attention to the details of the accessories in the foreground. Coffins, draperies and the open graves are minutely pictured, which tend to draw the eye from the principle object. The skeletons are inaccurately drawn, for the proportions of the bones are poor, resulting in a foreshortening of the frame. Artistically, the plates are fine, but for anatomical accuracy they are far inferior to those of Vesalius or to John Van der Gucht's beautiful engravings in Cheselden's "Osteographia."

The publication of this atlas did not meet with success for, as Choulant says, though the engraving is most elegantly done and is artistically perfect, the text is too short to be instructive. Consequently, the book was unsatisfactory to the anatomist and was too expensive for the beginner. It was of little use to the artist, for the complete musculature is not shown and often individual muscles are displaced. With all, however, this atlas of anatomy is a fine book and has hardly received the attention that it deserves.

A Dutch translation appeared in 1690, the shield in the allegorical title page containing at this time the following inscription: "Ontleding Des Menschelyken Lichaams Godaan door Govard Bidloo Anat. et Chiruig. Profesr." The Latin inscription has been erased from the copper plate and the new form of title re-engraved.

We must now pause for a moment, in following Godfried Bidloo, and shift our story to another character.

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[23] Dobell, C. Antony Van Leeuwenhoek and His Little Animals. N. Y., Harcourt, Brace, 1932, p. 220.

In the year 1666, when Godfried Bidloo was seventeen years of age, there was born in Petersfield, Sussex, England, the youngest son of Richard Cowper, or as sometimes written Cooper. This boy, William Cowper, when sixteen years of age was apprenticed to William Bignall, a surgeon of London, and later continued his apprenticeship with John Fletcher. There is little known of his younger years, but it may be presumed, from the records of work which he left behind him, that he was a diligent, hardworking young man with more than the average intelligence. There is no doubt that he was ambitious and wished to leave behind him the marks of his existence. One of his biographers accuses him, I think unjustly, of seeking a title which he never gained. But who of us do not wish for earthly rewards for our labors? There is no doubt that he was the outstanding English anatomist of his time[24] and that he held a position of esteem in the practice of surgery, though at this time there were few educated surgeons in London for Richard Wiseman (1622–1676), the great English surgeon of the seventeenth century, had died before Cowper began his career, leaving no one to wear his mantle. It is stated by Norman Moore that Cowper's attainments in pathology and comparative anatomy were as great as those in human anatomy and surgery. That on occasions Cowper allowed his desire for distinction to overrule his better judgment, there can be no doubt, and I fear on occasions he stooped to unscrupulous methods to obtain his desires, as will be seen by following the story of his life.

Cowper was admitted to the Company of Barber Surgeons in 1691 and, but three years later, published his "Myotomia Reformata; or a New Administration of the Muscles of the Human Bodies, wherein the true uses of the muscles are explained, the errors of former anatomists concerning them confuted and several muscles not hitherto taken notice of described: to which are subjoined a graphical description of the bones and other anatomical observations. [London, 1694.]" This octavo volume is illustrated with figures after the life. It was so well thought of that a second edition (large folio) was published in 1724, fifteen years after Cowper's death, which contained additions and corrections made by the author to the original manuscript and introduced by an "'Advertisement' signed Richard Mead [1673–1754], at whose charge this augmented 2nd. ed. was published."[25]

The year 1696 saw Cowper elected a fellow of the Royal Society. Two years later, when but thirty-two years of age, he published the large and handsome atlas entitled "The Anatomy of the Human Body." We must, however, leave for a few moments the description of this book while we continue tracing other events in the life of its author.

In 1702 a paper appeared describing the glands which bear his name.[26] It has been said that "Cowper's glands are known by name to more persons than their discoverer ever expected or perhaps deserved for he was not entirely honest in his dealings, though he was a good anatomist and the teacher of Cheselden."[27] Though these anatomical structures have been named for Cowper, it cannot be said that he deserves the credit of their discovery, for Jean Mèry (1645–1722) described them as early as the year 1684.

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[24] Richard Mead, in the "Advertisement" to Cowper's Myotomia Reformata, Ed. 2, 1724, says that Cowper "was universally allowed to be as eminent an anatomist as any of his time. . . . "

[25] Osler: Bibliotheca Osleriana. Oxford, 1929, #2384.

[26] Glandularum quarundam, nuper detectarum, ductuumque earum excretoriorum, descriptio, cum figuris.

Numerous papers were contributed by Cowper to the Royal Society, which appear in the *Philosophical Transactions*. Of two of these we must take notice, for they alone contain material important enough to carry the name of Cowper into the archives of medical history. One of these presentments describes the capillary circulation which he had demonstrated in the cat and the dog. This confirmed the work of Malpighi (1661), who demonstrated the capillary function of the pulmonary arteries and veins. Cowper, in 1705, pointed out that degenerative disease of the aortic valve caused a peculiar type of pulse. Norman Moore believes that this is "a discovery often erroneously attributed to Corrigan in 1829, more justly claimed for Vieussens in 1715, but certainly first made by Cowper."

William Cheselden (1688–1752), the well-known anatomist and surgeon of St. Thomas' Hospital in London, was, early in his career (1703), a house pupil of William Cowper.

Cowper retired to Bishop Sutton, Hampshire, because of poor health, suffering from asthma and dropsy, and died in the forty-third year of his life on March 8, 1709. A memorial stone, erected by his wife and containing a laudatory inscription, may be seen in the wall of the church at Bishop Sutton.

We will now examine Cowper's anatomic atlas, "The Anatomy of the Human Body," and then trace the steps in the controversy between Bidloo and its author. This book is of the same proportions as Bidloo's "Anatomia Humani Corporis" and contains all the plates of that volume except the one of the portrait of Bidloo, which is replaced by a mezzotint of Cowper. The text, which is in English, is entirely new. The date of publication is 1698. The title page reads as follows:

> The Anatomy of the Human Bodies, with figures drawn after the life by some of the best masters in Europe, and curiously engraven in one hundred and fourteen copper plates, illustrated with large explications, containing many new anatomical discoveries and chirurgical observations. To which is added an introduction explaining the animal oeconomy with a copious index by William Cowper. Oxford Printed at the Theater, for Sam. Smith and Benj. Walford, printers to the Royal Society, at the Princes Arms in St. Pauls Church Yard, London MDCXCVIII.

The true title page is preceded by the same allegorical illustration that appears in both editions of Bidloo, except that now the inscription upon the shield reads: "The Anatomy of Human Bodies by William Cowper Surgeon 1698." But let us examine this shield. No! its surface does not look regular and smooth and when we hold the paper of the page against the light, we see the shadow of other printing beneath the inscription. On closer examination, we discover that the new inscription is engraved upon a piece of paper which has been crudely pasted over the old and that the inscription that is obliterated is that which appears on the plate of the Dutch edition of Bidloo's anatomy. ("Ontleding des

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[27] *Brit. M. J.*, 1: 161; 404, 1898.

Menschelyken Lichaams, etc."[28]) This is a crude form of deception, as anyone can see what has been done.[29]

The portrait of William Cowper is a fine mezzotint from the hands of John Smith,[30] who had much reputation in his day, after the oil painting by Johann Clostermann.[31]

In glancing through this book we find that it is a great improvement over that of Bidloo's, due to the elimination of the short, insufficient Latin text and the replacement of a longer and more concise description of the plates written in English. There has also been added an appendix with nine additional plates.

Let us see what the author says in the preface which is headed, "To the Reader." First, there is the usual apology for any faults the reader may find with the book; he then continues by describing the order in which the subject is disposed. But what does he say about the one hundred and five plates taken from Bidloo's anatomy? Only this!

> These Figures were Drawn after the Life, by the Masterly Painter G. de Lairesse and Engraved by no less a Hand, and Represent the Parts of Human Bodies far beyond any Extant; and were sometime since Published by Dr. Bidloo, now Professor of Anatomy in the University of Leyden. I shall take the liberty here to acquaint the Reader, That in these Tables I have added above Seven hundred References, all of which are Letter'd with a Pen in the several Figures; . . . The Parts which in many Places had their Nomenclature barely annexed, are here Copiously Described; . . .

The one short sentence quoted above, which is inconspicuously placed in the text, is all the credit that Cowper gives Bidloo for the use of the one hundred and five handsomely engraved plates which he used without permission. True, he improved the value of these plates, from the standpoint of anatomical study, through laboriously adding by pen additional reference letters to the illustrations, thereby making them adaptable to the new descriptive text which accompanies them. But this does not excuse him for the act of plagiarism in appropriating the plates which were drawn by de Lairesse.

Cowper dedicated his book to the Right Honorable Charles Montague, First Lord of the Treasury, etc., in a drawn-out, laudatory message which covers five of the folio pages. Following this, in small type, are eight pages of text entitled, "The Introduction explaining the Animal Oeconomy," an intelligent discourse on physiology. The following excerpt from it is one of many of interest.

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[28] Moehsen was the first to point out this fact. (Quoted from Choulant.)

[29] If it was a fact, as stated by James Atkinson, that the Dutch publishers of Bidloo's book merely sold a certain number of impressions of the plates to Cowper's publishers, this affords an explanation why the inscription within the shield of the allegorical title page was not re-engraved but merely obliterated by covering it over. For the Dutchmen did not dare to change the plates, as Bidloo might again call for them and it would be embarassing for them if the plates had been tampered with.

[30] John Smith was born at Daventry in 1652, son of an engraver. He is considered the best mezzotint engraver of his time. Sir Godfrey Kneller took him into his employ and engaged him to produce engraved copies of many of his portraits. He died in 1742. His portrait, by Kneller, hangs in the National Gallery. (Bryan's Dictionary of Painters and Engravers.)

[31] Johann Clostermann was born at Osnabrück in 1656. He was the son of a painter, who taught him. Young Clostermann worked in Paris for DeTroyes, painting draperies. In 1691 he went to England and was employed by Riley in the same type of work. He was an artist of limited ability, but at that time art was at a low state in England. He painted some portraits, one of Queen Anne and another of the Duke of Marlborough, which now hang in the National Portrait Gallery. In 1696 he painted portraits of the King and Queen of Spain. He died in London in the year 1713.

> Upon the Invention of these Ova, DeGraaf and Others, who have successfully employ'd themselves in their Enquiries on this Subject, began to Erect an Opinion, That the Female only furnished the Matter of the Foetus, and the Male serv'd to Actuate it by its Prolifick Influence. This Opinion, which derogates much from the Dignity of the Male-Sex, prevailed until Mons. Leeuwenhoeck by the Help of his Exquisite Microscope, in which he has been well pursued by Mr. Melling, detected Innumerable small Animals in the Masculine Sperm, and by this Noble Discovery, at once removed that Difficulty, and added much to the Theory of Generation.

The plates appear in the same order as they do in Bidloo's anatomy. Each illustration is accompanied on the opposite page by a well-written description on the subject of the pictured specimen. These descriptions are written in detail and are clearly and intelligently expressed, so that the full value of each plate is recognized. The type is handsome and many of the pages are embellished with fancy initial letters at the beginning of the text and ornamental tail pieces at the close of the page, a few of which depict anatomical scenes.

"The Appendix," which is entirely new, contains nine plates and is described by the author as "partly a supplement to the preceding Tables and partly a correction of such things as are not well expressed." The plates of "The Appendix" do not compare in beauty and execution with those drawn by de Lairesse. The first two are of full-length figures, demonstrating the superficial muscles of the body. The pattern is that of the Vesalian style but they lack artistic merit. They are signed by H. Cook, the designer,[32] and by M. Van der Gucht, the engraver.[33] The remainder of the plates of "The Appendix" picture different portions of the body. There is a diagram of the fetal circulation, and illustrations of dissection of the brain, muscles of the face, etc. All these latter plates are signed by Van der Gucht, alone, who apparently designed and engraved them.

There can be no doubt that Cowper's anatomy is a fine compilation; containing artistic and fairly exact illustrations which are accompanied by an accurate, well-written text. Cowper, in "The Anatomy of the Human Bodies," supplies what was lacking in Bidloo's "Anatomia Humani

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[32] Henry Cooke, son of Henry Cooke, was born in England in the year 1642. He studied in Italy under Salvator Rosa. He painted the choir in New College Chapel, Oxford, the stairs at Ranelagh House and Lord Carlisle's House, Soho Square, and finished the portrait of Charles II in Chelsea Hospital. It is said he committed a murder and fled from England and after his return was employed by William III to repair the "Cartoons of Raphael." He died in 1700. (Bryan's Dictionary of Painters and Engravers.)

[33] Michial Van der Gucht was born in Antwerp in 1660. He was a pupil of one of the Boutats and soon after crossed to England and continued his studies under Loggan. He engraved many of the portraits for Clarendon's History. He died in 1725. Michial Van der Gucht is best known by being the father of John, the artist responsible for the fine engravings in Cheselden's "Osteographia." (Bryan's Dictionary of Painters and Engravers.)

Corporis." Through the appropriation of Bidloo's beautiful illustrations by de Lairesse and by writing a text that was worthy of them, he constructs a fine anatomy and the book became a success. Norman Moore writes that "it took its place as the best English anatomy which had appeared." It was generally used for the next fifty years. A second English edition and a Latin edition were published in Leyden in 1737,[34] twenty-eight years after Cowper's death. Choulant mentions another edition as having been published in 1750. The English edition was revised by C. B. Albinus, second son of the great Albinus, Professor of Medicine, Anatomy, Surgery and Practice in the University of Utrecht. The portrait of Cowper does not appear in either of these editions. Although an entirely new type has been set, the revisions mentioned on the title page are not particularly evident. The inscription upon the shield of the allegorical title page has been revised through the re-engraving of the plates. Many of the illustrations have lost their sharpness, due to the wear of the copper plates.

Cowper's anatomy was first published in 1698, but it was not until 1700 that the storm of wrath broke out in full force. In that year a quarto-pamphlet of fifty-four pages was published by Bidloo, from Leyden, addressed to the Royal Society and entitled, "Gulielmus Cowper, criminis literarii citatus, coram tribunali . . . societatis Britanno-Regiae." James Atkinson tells us:

> Bidloo was wonderfully enraged at the liberty which Cowper had taken; as is most vindictively exhibited in a charge against him; in which the latter was "Criminis literarii citatus." He called Cowper a highwayman and directed vindictive language at him, whom he belittles as "a miserable anatomist who writes like a Dutch barber."

Norman Moore tells us that several years before the appearance of this pamphlet Dr. Hutton, who was helping to care for William III, informed Bidloo that Cowper was about to translate and plagiarize his work. Bidloo immediately thereafter wrote Cowper, in Latin, and it can be expected in no uncertain terms. Cowper failed to respond and other letters followed. Finally, Bidloo charged Cowper and his publishers, Smith and Walford, with fraud for publishing the plates and for issuing a mere pirated compilation of the Anatomy. This brought a response from Cowper, which denied Bidloo's sole rights to the plates and repudiated the charge of having borrowed the text. For had he not made his own, by toil and labor? And there was nothing in it resembling Bidloo's except the common basis of the universally accepted knowledge of anatomy. Bidloo incorporated all this early correspondence in the pamphlet addressed to the Royal Society.

Cowper's reply, a retort courteous, was made with satirical language, in pamphlet form, in the year 1701.

> Εὐχαριστία, in qua Dotes plurimae et singulares Godefridi Bidloo M.D. et in illustrissima Leydarum Academia anatomiae professoris celeberrimi, peritia anatomica, probitas, ingenium, elegantiae Latinitatis, lepores, candor, humanitas, ingenuitas, solertia, verecundia, humilitas, urbanitas, etc., celebrantur et ejusdem Citationi humillimè respondetur.

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[34] Printed for John Arnold Langerak, 1737, and to be had in London, Messrs. Innys and Manby at the West End of St. Paul's.

Apparently Cowper believed that a "soft answer turneth away wrath," for, as James Atkinson writes, "Cooper did not choose to exchange the thrust of a snic-a-snee with the Dutch professor, yet, he smoothed him over with the retort courteous, in his Eucharist." Though courteous, Cowper did not withdraw from the fray. He stated that the illustrations in Bidloo's and his anatomies had been drawn by Gerard de Lairesse for Jan Swammerdam, who died four years before the appearance of Bidloo's publication, and that his (Cowper's) publishers had purchased the impressions and he had been requested by them to write an entirely new letter press, in English, for the illustrations. He, therefore, denied the charge of piracy in the question of the use of the illustrations for, under these circumstances, did he not have as much right to them as Bidloo? As far as the text was concerned, the book was new, for had he not written an entirely new description of the plates? Be that as it may, Cowper did more than to merely acquiesce to the request to write a letter-press to Bidloo's plates, for it is said he was a party to the transaction and made occasional trips to Holland during the time the book was under preparation. It is strange that Bidloo did not attach more blame to his own publishers, who were the custodians of the plates and who apparently sold the prints to Cowper or his agents.

The charge of plagiarism cannot, I think, be held against Cowper in the matter concerning the text. But what about the plates, is there any truth in Cowper's statement that they were drawn for Swammerdam? I think not, for Cowper was unable to substantiate this claim by means of evidence, and in the preface of the second edition of his "Myotomia Reformata" he credits Bidloo with the illustrations in the following manner: "The sculptures of Bidloo are not to be forgotten, since they express divers muscles and other parts so near life." If it were so, the last vestige of esteem vanishes for Bidloo, as an anatomist, for we know that the only reputation due Bidloo through the compilation of the "Anatomia Humani Corporis" is that of preparing the specimens which inspired the drawings of de Lairesse. I think, therefore, that Bidloo must be given the credit for having the illustrations prepared, and that Cowper merely used this statement to exonerate himself for using them. We must, however, acknowledge that Cowper recognized the possibilities of these illustrations and employed them to better advantage than Bidloo. But we cannot condone the methods that were utilized for the appropriation of these plates. Because international copyright laws were not in existence at this time, is no reason to believe that Cowper should not have at least asked permission of Bidloo to use the illustrations. The act of plagiarism could not possibly pass undetected and the camouflage of the allegorical title page of Cowper's first edition is so self-evident and childish in its attempt to deceive, that we cannot credit Cowper with an over-abundance of commonsense. However, the opinions of those who were contemporaries give little sympathy to Bidloo. Boerhaave judges the plagiarism of little moment because of the small value of Bidloo's text.[35] In later years James Atkinson takes the point of view that the result justified the means. He writes:

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[35] Methodus studii medici, Amsterdam, 1751. (Quoted from editorial note in Choulant.)

On the other hand we must observe, that Cooper published them as Bidloo's. Therefore he did not commit a clandestine plagiary; and although it certainly was taking an undue advantage of Bidloo's labors and profits, yet the public have been much benefitted by the many elucidating cases, and excellent surgical remarks which Cooper had added.

A closer examination of copies of the first edition of these works presents an interesting fact. Bidloo's anatomy is stated to have been published in Amsterdam, which there is no reason to doubt. The title page of Cowper's anatomy bears the information that it was printed at the Theater in Oxford. We know that the later editions were published from Leyden. The reader has been informed that the paper of the pages of Bidloo's anatomy contains a water mark which is undoubtedly that of a continental paper maker. An examination of the pages of Cowper's anatomy (first edition) reveals that they are fabricated of the same paper, both as to texture and water mark, as those of Bidloo's. This is not confined alone to the pages containing the illustrations, but also to those of the text and to those of "The Appendix," both text and illustrations.[36] This fact brings to our attention the question of whether Cowper's anatomy was really printed in England. Did his publishers send to Holland for the paper or was the entire book printed in that country? Choulant states that "On account of the small sale of the work the publishers gave three hundred impressions of these plates to the English Surgeon and Anatomist William Cowper." All authorities agree that the impressions from the plates were sent to England for Cowper's anatomy. This would explain the appearance of the water mark in the paper of these pages, but how are we to interpret its appearance in those of the text and of "The Appendix"? Some doubt may arise as to where the text was printed. But if Cowper's book be carefully examined it will be found that the text "bears all the signs of Oxford printing in its ornamental letters and its ornaments." Mr. John Johnson, printer to the University, of whom I enquired, has verified this fact and, further, he tells me that "it was the commonest thing in the world at the time for Dutch paper to be used in English printing. The paper of the English mills had still a very bad reputation." Mr. Johnson concludes his letter by saying, "So I am satisfied that Cowper was in this sense Oxford printing." This explanation fully accounts for the uniformity of the texture of the paper used in the leaves of Cowper's book and removes any doubt as to where it was printed.

It has been said, and I think with some truth, that Cowper's anatomy may be regarded as but a later edition of Bidloo's. Therefore, Bidloo must be given due credit for any success that Cowper's anatomy attained. That it did attain distinction, there is no doubt, as shown by the publication of later editions.

It is difficult to estimate the exact value of Cowper's book and the influence it had upon the study of anatomy. At the time it was published we are told that the teaching of anatomy in England was at its lowest ebb. This was in 1698. Within the next twenty-five to thirty years, however, there were several important schools of anatomy established in London. William Cheselden, in 1713, wrote a book of anatomy. It was a

[36] The paper that was used for the later editions of Cowper's anatomy has a different water mark than that of the first edition.

small volume, octavo in size, and cannot, therefore, be compared with Cowper's large atlas. It was, however, republished in many editions. His "Osteographia" is the finest atlas of the bones of the body that had been produced and I think Cowper may have placed the thought of this atlas in Cheselden's mind when he was his master. Edinburgh's fame for medical study began in 1720, when Alexander Monro (1697–1767) was elected "Professor of Anatomy in this City and College" by the Town Council.[37] Monro had studied in Leyden but had come indirectly under the influence of Cowper, through having been at an earlier time a pupil of Cheselden. Later, there were in London James Douglas (1675–1742), with whom William Hunter lived as resident pupil; Samuel Sharp (1700–1778) and Percival Pott (1714–1788) and, following these men, the Hunterian school came into existence. We can only speculate as to the influence that Cowper's book had on the development of anatomical study in England. That Cowper's anatomy was extensively used, there is little doubt, for it was the most complete discussion of the subject that had as yet been published in the English tongue. Though we are told it owes its popularity to the fact that the study of this subject was at its lowest ebb in Great Britain, this cannot be used as an argument that the book did not influence the renewed interest shown in the study of anatomy which soon after spread throughout the Kingdom. There is enough evidence, I think, to believe that this book, a compilation of two authors, was the first sign of the rebirth of the interest which, propagated by others, lead on to the time when Edinburgh and London came to replace Leyden as the center of medical education.

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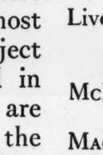

Fig. 8. Tracing of the Watermark Which Appears in All the Paper Making Up the Pages of Bidloo's and Cowper's Anatomies.

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[37] Quoted by Ball, J. M. The Sack-em-up Men. Lond., Oliver & Boyd, 1928, p. 54.

THOMAS ADDISON AND HIS DISCOVERY OF IDIOPATHIC ANEMIA*

By ESMOND R. LONG, M.D.

PHILADELPHIA

ON November 21, 1874 an editorial appeared in the *Medical Times and Gazette* of London entitled "Pernicious Anemia: A New Disease." Remarking that the advance of knowledge is ever bringing to light new diseases the author directed attention to the recent observations of Biermer of Zurich, noted that Biermer's original description had been confirmed by Immermann of Basel, and added in conclusion: "We are not aware that any case has as yet been reported in Great Britain; but no doubt there will soon be many observers on the lookout for it."

This drew a quick retort from that loyal historian of Guy's Hospital, and devoted biographer of its great physicians, Samuel Wilks. In a letter published seven days later in the *British Medical Journal* (November 28, 1874) Wilks "begged leave to remind its readers that the disease was well known in England." He had, he declared, heard Dr. Addison lecture on it as far back as 1843 and had himself published accounts of several fatal cases in *Guy's Hospital Reports* for 1847–49. For the information of those who had forgotten, he repeated Addison's original description, thereby introducing "Addison's anemia" among the several eponymic terms coined by this disciple of Guy's Hospital, who had grown up in the tradition of Addison, Bright and Hodgkin.

Addison's only extended account of the disease, a clear and unmistakable description, occurs in the introduction to his famous monograph "On the Constitutional and Local Effects of Disease of the Supra-Renal Capsules" (London, 1855). It is too well known to repeat here, but it is worth while to recall that it was in the search for the cause of pernicious anemia that Addison was led to the discovery of the endocrine disturbance now universally known as "Addison's disease." In his own words he had "for a long period from time to time met with a very remarkable form of general anemia, occurring without any discoverable cause whatever," to which "he had applied the term 'idiopathic,' to distinguish it from cases in which there existed more or less evidence of some of the usual causes or concomitants of the anaemic state."

Just how "long a period" before 1855 he had been studying pernicious anemia we do not know. He reported on the condition in brief before the South London Medical Society in 1849. A summary of his remarks is published in the *London Medical Gazette*, March 15th of that year. Apparently he presented descriptions of the disease on two or three other occasions to the Medico-Chirurgical Society, but because of deficient interest on the part of the editors, and apparently because of his own lack of popularity in general medical circles, his papers were not approved for publication.

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*Read at a Meeting of the Sections on General Medicine and Medical History, College of Physicians, Philadelphia, Jan. 24, 1934.

As noted, Wilks had first heard him describe the disease in 1843. In all probability the condition never struck Addison with the full force of a new discovery. The disease was already in the English consciousness for the good reason that it had been described before. Addison's discovery, like Biermer's, was only a rediscovery. In 1822 the Scottish physician and surgeon, James Scarth Combe, had reported a typical case to the Medico-Chirurgical Society of Edinburgh, which was published in the *Transactions* of that Society for 1824 with full clinical account and description of the state observed post-mortem. This description, too, is now so well known that it need not be repeated. Historians of the subject of pernicious anemia seem agreed that Combe's was a genuine case. Had he cared to push his claim the honor of the discovery might be his as well as Addison's. But this genial old Scottish gentleman seems to have been content to let it pass, nor did his friends recall it. His obituary in the *Edinburgh Medical Journal*, 1883, sixty-one years after his own original description, thirty-four after Addison's and sixteen after Biermer's, made no mention of pernicious anemia or of Combe's valid claim to its discovery.

But it had not passed entirely unnoticed. Combe's case was cited in the well-known "Principles and Practice of Medicine" of John Elliotson in 1839, a work with which all English physicians, including Addison, were presumably familiar. Elliotson himself described the condition as if it were fairly well-known, classifying it with the "universal diseases" in contradistinction to those with a recognized anatomical seat.

To appreciate the significance of the distinction it must be recalled that this was the declining day of the age-old humoral pathology. The time was hardly past when the Greek and Latin classics were still being seriously read for their medical content. The definite association of diseases with organs was not much older than our cellular pathology is today, and Addison, himself an excellent scholar of medical Latin, was only as far from Morgagni as we are from Virchow. The new effort to ascribe each disease to a particular organ was so intense that medical statisticians like Barclay, Medical Registrar at St. George's Hospital, considered this "preference of the structural to the humoral pathology" at times an evil, because it did not permit "due consideration to the morbid state of the blood itself." In the article voicing this lament, in the *Medical Times* of 1851, Barclay also reported two cases of anemia with post-mortems, which from the description might well be interpreted as pernicious anemia. But, as he noted, these diseases of the blood were "so little acknowledged that they found no place in the classification of the Registrar-General."

This was in 1851, two years after Addison's first printed mention of idiopathic anemia. The idea was getting around. Andral and other French investigators as well as English, had published good descriptions of the morphological and clinical condition of the blood in various morbid states, with many observations on chlorosis and some references to what may have been pernicious anemia. The anemia of pregnancy was well known. Hughes Bennett had stressed the anemia occurring in the condition of leucemia first described by himself and Virchow in 1846, and almost every observer after his time made some mention of the proportion of white cells in putting on record any case of anemia. Addison himself apologized for omitting this search, but noted that his observations were made before the appearance of Bennett's report, a fact enabling us to date his first studies as prior to 1845.

Addison never published a separate paper on idiopathic anemia. His two printed notations on the subject were both in connection with disease of the suprarenal capsules. In the first of these, in 1849, he associated the two conditions. In the monograph of 1855 he explained that it was in search for the cause of idiopathic anemia that he had "stumbled on" the lesions of the suprarenals. He then definitely dissociated the two morbid conditions, stating clearly that in cases of idiopathic anemia, he found nothing characteristic on postmortem examination except fatty degeneration of some of the organs.

In the absence of a separate formal report it is not surprising that the world overlooked his excellent description of pernicious anemia. That description, good as it was, came in only incidentally and was quite overshadowed by the spectacular discovery of *melasma suprarenale.* In Guy's Hospital the two conditions became increasingly familiar, and were recorded separately from time to time in the *Guy's Hospital Reports*, but the rest of England forgot the anemia until Wilks and another Addison pupil, Pye-Smith, made it clear to all the world that Addison had described the disease twenty years before Biermer. Pridefully, if belatedly, the English commenced to distinguish the now well-known disease as "Addison's anemia."

Addison's rather forbidding character had much to do with his failure of recognition in his own lifetime. The outstanding figure in Guy's Hospital in its greatest period, beyond the hospital he made little impression. As Hale-White has written:

> Neither the *Lancet* nor *British Medical Journal* published an obituary notice of him when he died [only the *Medical Times and Gazette* did], the College of Physicians did not elect him a Fellow until nineteen years after he had been a Licentiate, his name never appeared among the list of candidates for the fellowship of the Royal Society, no University gave him an honorary degree, he held no Court appointment, he was not a member of the newly formed Pathological Society, and the Royal Medico-Chirurgical Society refused to publish some of his papers, even after he had become president of it.

But he had a devoted biographer, and, as with other unappreciated geniuses, his fame grew with the years after his death. In 1874 none would disagree with the beautiful tribute from his friend Dr. Lonsdale, who wrote of his funeral ceremonies:

> Lanercost Priory has a time-honored history of seven and a half centuries. Within its precincts the warrior knight, the lordly Abbot, the yeoman bold of times gone by sleep their last sleep, but from the days of . . . the founder . . . down to our own day no truer man in science and honor and practical usefulness lies there enshrined than Thomas Addison, M.D.

It is altogether fitting that Addison's tomb, to which Lonsdale refers with such sentiment, is in the permanent care of Guy's Hospital, where Addison labored for forty years and incidentally "stumbled on" four morbid states, hitherto little known or quite unsuspected: xanthoma, circumscribed scleroderma, Addison's disease and pernicious anemia.

JOHANNES LANGE OF HEIDELBERG

By RALPH H. MAJOR, M.D.

KANSAS CITY, MO.

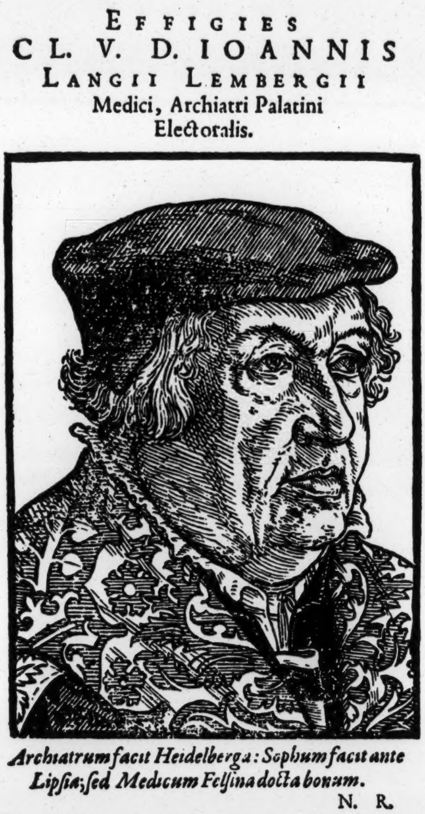
ONE of the most interesting medical figures of the sixteenth century was Johannes Lange, described as "Archiater Palatini Electoıalis" in his portrait shown in Figure 1. It would have been more accurate to have described him as "Archiater Palatini Electorum," since we are told that he was Archiater to no less than five electors. Garrison credits him with the first clear picture of chlorosis which he describes as the "morbus virgineus" or disease of virgins. This classic account of chlorosis appears in his "Epistolarum Medicinalium," a collection of essays on various medical topics which was highly prized by the physicians of that day and went through six editions.

Above the woodcut of Johannes Lange which appears as a frontispiece of this work, he is described as "Lembergii" while underneath we read that Heidelberg made him Archiater, Leipsic created him a scholar but Felsina (Bologna) had pronounced him a good doctor. His biographers tell us that he was born in Löwenberg in Silesia in 1485 which accounts for the designation "Lembergii." He studied first in Leipsic, devoting himself to philosophy and natural science, receiving his master's degree in 1514. He taught in Leipsic for a time but following his natural bent for medicine, left Germany and migrated to Italy, the center of medical knowledge. He proceeded first to Ferrara where he sat at the feet of the learned Nicolo Leoniceno then at the height of his powers and reputation. Many of the teachings imparted by the venerable Leoniceno to the youthful Lange appear later in Lange's epistles. He presently went to Bologna where he remained for some time studying under the celebrated Giacomo Berengario da Carpi.

Benvenuto Cellini in his immortal Autobiography gives two somewhat different accounts of Berengario da Carpi. In the first book of his Autobiography he says:

> There arrived in Rome a surgeon of the highest renown, who was called Maestro Giacomo da Carpi. This able man, in the course of his other practice, undertook the most desperate cases of the so-called French disease. In Rome this kind of illness is very partial to the priests and especially to the richest of them. When, therefore Maestro Giacomo had made his talents known, he professed to work miracles in the treatment of such cases by means of fumigations. . . . He was a man of much learning, who used to discourse wonderfully about medicine. The Pope would fain have had him in his service but he replied that he would not take service with anybody in the world.

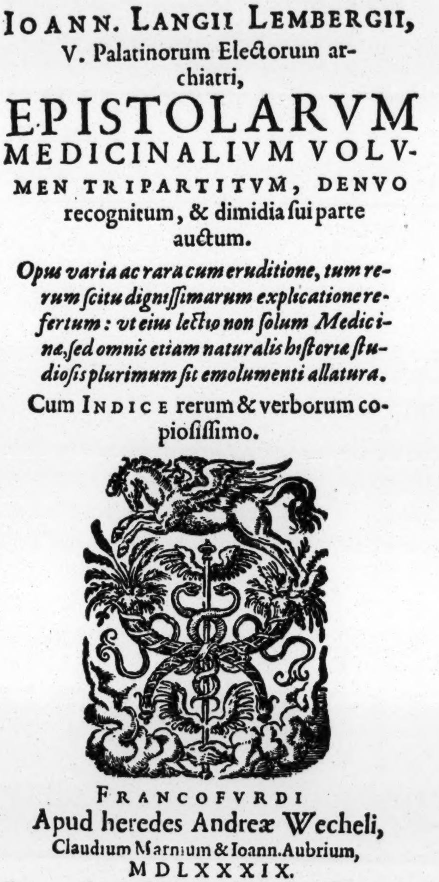
Later, however, Cellini speaks of him as "the charlatan Maestro Jacopo, the surgeon from Carpi." He came to Rome and spent six months there, during which "he bedaubed some scores of noblemen and unfortunate gentlefolk with his dirty salves, extracting many thousands of ducats from their pockets . . . at the present moment in Rome all the miserable people who used his ointment are crippled and in a deplorable state of health."



EFFIGIES
CL. V. D. IOANNIS
LANGII LEMBERGII
Medici, Archiatri Palatini
Electoralis.

Archiatrum facit Heidelberga: Sophum facit ante
Lipsia; sed Medicum Felſina docta bonum.
N. R.

FIG. 1. FRONTISPIECE TO LANGE'S "EPISTOLARUM MEDICINALIUM."



IOANN. LANGII LEMBERGII,
V. Palatinorum Electorum ar-
chiatri,
EPISTOLARVM
MEDICINALIVM VOLV-
MEN TRIPARTITVM, DENVO
recognitum, & dimidia ſui parte
auctum.
Opus varia ac rara cum eruditione, tum re-
rum ſcitu digniſſimarum explicatione re-
fertum: vt eius lectio non ſolum Medici-
næ, ſed omnis etiam naturalis hiſtoriæ ſtu-
dioſis plurimum ſit emolumenti allatura.
Cum INDICE rerum & verborum co-
pioſiſſimo.

FRANCOFVRDI
Apud heredes Andreæ Wecheli,
Claudium Marnium & Ioann. Aubrium,
MDLXXXIX.

FIG. 2. TITLE PAGE OF LANGE'S "EPISTOLARUM MEDICINALIUM."

Fortunately for the reputation of Berengario da Carpi, Cellini, while a fascinating writer, was never noted for his veracity. Choulant praises Berengario most highly and states that he "corrected a great mass of errors and with him began the independent untrammelled investigation in the anatomy of the separate parts of the body. He created the first illustrations made from nature." So Johannes Lange after all studied in Bologne under one of the masters in anatomy and not with a charlatan.

From Bologna Lange went to Pisa where he received his doctor's degree in 1522 and now, at the mature age of thirty-seven, brought his Wanderjahre to an end and returned to his native land. He had traveled extensively, had studied under the greatest masters of the age and had profited by his unusual opportunities. After his return to Germany he entered the service of the Electors of the Palatinate and later was appointed Archiater. He served the Elector Friedrich II, the "Wise," for thirty-seven years, traveled over Europe with him and was with him on the two memorable occasions in Hungary when the Elector gave battle to the Sultan Suleiman. On the death of Friedrich his nephew Otto Heinrich became Elector and the new ruler appointed Lange a minister and privy councilor. After a long life in the service of the electors Lange died at Heidelberg in 1565 at the age of eighty.

Thus Lange spent a great part of his long life at the court of the Electors in Heidelberg. He probably lived in the magnificent castle which now after the lapse of centuries, Longfellow described as "next to the Alhambra of Granada . . . the most magnificent ruin of the Middle Ages." The magnificent Otto Heinrichs building in German Renaissance style, which is still one of the glories of German creative art, was erected before his eyes. Heidelberg, one of the most beautiful and romantic spots on earth, in his day was the seat of a powerful prince, the scene of a brilliant court. The huge castle kitchens which today astonish the visitor with their magnitude were then the scene of great activity and although the Great Tun was not yet built, there were probably other tuns filled with wine to slack the thirst of the assembled guests. Heidelberg was in Lange's day, as now, the seat of a great University founded by the Elector Rupert I in 1385, and Otto Heinrich the Magnanimous, Lange's patron, endowed it and founded its library. Although Otto Heinrich ruled only four years, these years were notable ones in the history of the Palatinate, years of peace and happiness devoted to the interests of culture and learning. A portrait of this prince by Barthel Beham, disciple of the great Albrecht Dürer, hangs in the castle museum. The Heidelberg of today, ancient as it seems, was not the Heidelberg of Lange. During the years 1689 to 1693 the French sacked the town, blew up the castle and left only one house in the market place unharmed.

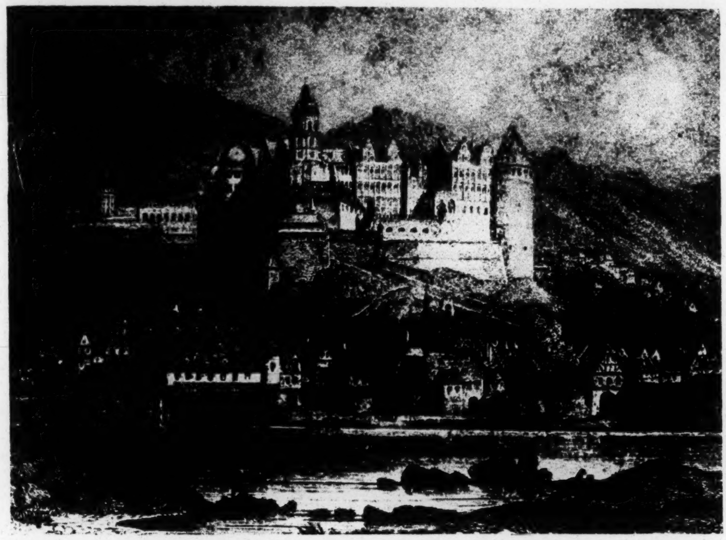


FIG. 3. HEIDELBERG BEFORE THE THIRTY YEARS WAR.

During the period when Lange flourished, it was a custom of learned physicians to write letters to their fellow physicians or even to their personal friends describing their experiences in the practice of medicine. Lange followed this time-honored custom, composed such letters on various occasions and finally saw them published in Basle in 1554. A second edition appeared in 1560 and like the first contained eighty-three letters and bore the title "Medicinalium epistolarum miscellanea, varia et rara." The third edition, on which this paper is based appeared at Frankfort in 1589, bears the title "Epistolarum medicinalium volumen tripartitum," and contains 150 letters. Later editions were published in Frankfort in 1605 and 1689 and in Hanau in 1605.

FIG. 4. OTTO HEINRICH, ELECTOR PALATINE. PORTRAIT BY BARTEL BEHAM IN THE CASTLE MUSEUM.

Lange, we are told, also wrote poetry and several epigrams in praise of milk and cheese. He was so fond of cheese that he ate it at every meal and praised it on every possible occasion. He also wrote several other medical treatises, notably one on scurvy, which was published at Wittenberg in 1624 with the better known treatise of Sennert. His fame, however, rests chiefly on his epistles.

Lange begins his book with the usual "prefatio" to the "candido Lectori." He compares the learning of his German colleagues with that of the Italians much to the disadvantage of the former. He denounces first the fool-hardiness of the physicians who foretell everything from the urine and have not the slightest acquaintance with Hippocrates and Galen. He also assails the surgeons "ignorant of all learning," who know nothing about the use of surgical instruments and mistreat their patients most shamefully. He next pays his respects to the empirics who diagnose by looking at the tongue and diagnose all fevers as "Breun," which they claim has its seat in the tongue. Then he says they treat the tongue with salves and diluted horse dung. When the epidemic of sweating sickness (sudor Anglicus) raged in Germany "more were destroyed by the foolhardiness of the empirics than by the disease or by the sword of the enemy." Lange closes the preface by saying that although he is "nearly overwhelmed by the mass of affairs," yet he writes these letters to protect the people from these swindlers and charlatans. "In which," he says, referring to the letters, "I think to make clear to these sixpenny Doctors [his triobolatibus Medicis] whose total art rests upon the information from the urine, certain unknown diseases, and the proper method of their cure."

Although written nearly four hundred years ago this has a familiar ring. As Lange sent his message through that new invention of his age, the printing press, we now hear the same thought over that new invention of our age, the radio. And as long as the race persists we will probably have our six-penny doctors and a host of people needing salvation from quacks, and refusing to be saved.

Johannes Lange continues in this frame of mind and his first few letters discuss "pseudo-doctors," "how difficult it is to free medicine from errors and superstitions," and "concerning the ignorance of surgeons in treating abscesses from wounds." However, he soon lays aside his scolding and begins to write his letters in a more constructive frame of mind. In all his epistles, however, he can not entirely hide his feeling that he had a very superior education in Italy and that these physicians and surgeons in Germany are a rather ordinary lot, in which he was probably correct.

In epistle five he discusses fracture of the skull. Lange is very much amused at the German doctors who thought that an abaptista was a surgical instrument which had been baptised and did not know that the word meant a trephine. He relates that at mention of an abaptista "they were all stupefied, all attention and held their mouths open." Then one said:

> Doctor Lange thou seekest in vain an abaptista in Germany. For with us the instruments of surgeons are not baptized but the fields and children. Then I laughing a little said that I not only saw the abaptista of Romet during the life of Leo the Pope with Vigo from Liguria the surgeon of Pope Julius: because of its use in perforations of the skull they did not injure the membrane of the brain or puncture it . . . also these trephines of Rome, because of the presence of the Pope they intimated could be easily baptised.

It is interesting that Lange in Italy came in contact with the immortal Giovanni de Vigo whose "Practica in arte chirurgia copiosa" ran through fifty-two editions and was for several centuries the standard textbook on surgery.

In his twenty-first letter Lange discusses the disease of virgins, "de morbo virgineo." Here, according to Garrison, we have the original description of chlorosis. Chlorosis was a rare disease in ancient times and is today. Hansen and Parkes Weber point out that in ancient Greece and Rome the custom of tight lacing was not in vogue. This style became popular in the sixteenth century and from this time on chlorosis became common until about the beginning of the twentieth century when the style again changed. Whether the corset caused chlorosis or not, as Hansen and Parkes Weber suggest, the disease was probably common in Lange's day and he gave a masterful description of it. He describes the girl, "sadly paled, the heart trembles with every movement of her body, and the arteries of her temples pulsate, & she is seized with dyspnoea in dancing or climbing the stairs, her stomach loathes food and particularly meat, & the legs, particularly at the ankles, become edematous at night," Lange declares that "Venus cures the disease of virgins": "If they marry and conceive, they recover." Therefore he advises his friend to whom he addresses the epistle to give away his daughter Anna in marriage and adds: "I shall be present at the nuptials with pleasure."

Lang's forty-fourth epistle is of interest to the sanitarian for it treats "of lead pipes of aqueducts and the signs of healthy water." He speaks of the deleterious effects from drinking water running through lead pipes, quotes the warning of Vitruvius and mentions Nikander's account of the poisonous effects of cerussa when taken into the body. This epistle, like most of the one hundred and fifty in the book, shows the author's profound knowledge of the medical literature of the past. Indeed Lange's veneration for it is reflected upon almost every page. In his chapter on the English sweating fever (De causis sudoris Brittanici Episola XIX) he affirms that this is no new disease but was described by Galen as "febris Typhodes." Again in his Epistola XV, Book II he discusses the new disease described by Hieronymus Fracastorius "de nova Italorum febre lenticula" (typhus fever) and says it is an old disease. Aetius, quoting Herodotus, he remarks, describes a fever in which the body is covered with "spots like the bites of fleas." He adds "now I ask if it is possible to describe the lenticular fever more clearly than it was described by Aetius and Herodotus."

This theme of the greatness of the past is further developed in his epistle "de novis morbis." He was a firm believer in the antiquity of all disease although he thought it probable that any disease could be profoundly modified by time, climate and geographical distribution. Diseases "thus also gradually disappear, or degenerate into another species of disease, thus that sweating fever from Britain & that contagious venereal plague from Naples which since they are a hodgepodge of many diseases [multorum morborum farrago] can easily be changed into other diseases." Lange refers to syphilis in this letter and in several other places in his book. Although an eye witness of the first great pandemic of syphilis he did not believe it was a new disease. He was certain the ancients were familiar with it, quoting Aretaeus, Dioscorides, Aetius and Galen in support of its antiquity. Here Lange sees eye to eye with his master Nicolo Leoniceno who thought it an ancient malady and quotes the same evidence in his "de morbo Gallico." Lange does not agree with di Vigo that it was "a malady of a nature unknown up to that time." In this letter Lange also discusses Scurvy or *Scherbok* which he says Pliny described in Germany and Strabo in Arabia some fourteen hundred years before.

In Book II, letter LVII Lange discusses in a most interesting fashion stones in the bladder, kidneys, gall bladder, tonsils and lungs. He writes:

> In dissecting the body of Frederick Duke of Saxony, Imperial Roman Elector, it is related that three rather soft stones were found. A vestal virgin from Newburg on the Danube was afflicted with continual cramps in the right hypochondrium while the doctors were not able to explain the cause of this continued pain nor give aid. The most illustrious prince Otto Heinrich Count Palatine ordered the body of the deceased to be dissected: in whom in the various viscera especially the liver these very things were found. The gall bladder of which hung down by the weight of the contained stone.

After all Lange's criticisms that his brother Germans are hopelessly behind the times and must be cleansed of their superstitions and silly beliefs, it is a bit disconcerting to turn to Epistle XXXIIII in Book II and find it entitled: "Whether demons afflicting human bodies with diseases; submit to exorcism; lastly by what method such diseases are cured." We must remember that Lange lived in the sixteenth century and in common with the learned men of his time believed in the existence and also the personal appearance of the Devil. Indeed, did not his great contemporary Luther throw a bottle of ink at Beelzebub when the latter interrupted his labors in the Wartburg. As a good Christian he was firmly convinced of the existence of people possessed by evil spirits and in the existence of witches. We should not judge Lange too harshly, however, and should remember that almost in our own times the Reverend John Wesley declared that "giving up witchcraft is in effect giving up the Bible."

Lange assembles an imposing array of authorities to buttress his belief in demons and demoniacal obsessions quoting Pliny, Plutarch, St. Augustine, St. Peter, St. Paul, St. Chrysostom, King Solomon and Eusebius. Those obsessed he says suffer from black bile (atrabile) and "Pomponatius my preceptor in philosophy at Bologna, relates that the old exorcists [whom they called praecantatores] before taking the oath, purged the bodies of those obsessed from the atrabile." The demons after leaving the bodies of those possessed, he says in the next epistle, remain in the air for a time and then migrate to distant lands and islands. They have been described in Switzerland, in Britain and in other parts of the world. They also love to hide in mines and suffocate the workers with their sulphurous breath. A perusal of these chapters convinces us that Lange with all his deep learning and his extensive travels was still very much a child of his century.

Lange covers much ground in his one hundred and fifty epistles. He discusses gonorrhea, the functions of the epiglottis, insomnia, noctambulism, infusions, pills, plasters, clysters, various drugs and plants and even devotes a chapter to geography in which he mentions America, the voyages of Americus Vespucius and many other discoveries of interest. Finally he comes to his last chapter or letter, the climax of the entire collection.

This last epistle he calls "Medicum de Republica symposium" (may we translate this "Symposium on Medical Education?") and he dedicates it to the Noble Eberhard, Count of Ertbach the Arch cup-bearer of the Palatinate, obviously an important personage at the court of the Elector. In this epistle he castigates the impudence of certain physicians, their frauds and deceits, pays his respects to the urine casters and discusses with great scorn the superstitions and use of incantations in medicine. He pays high tribute to the achievements of theology and of law and adds that the study of medicine is also necessary. He points out the ignorance of the physicians and surgeons and urges stipends as "spurs to doctors and students of worth." As a precedent he refers to the stipends granted to physicians in ancient times. The whole letter is a most dignified and learned treatise upon medical education pleading for higher standards of education, greater opportunities for study, scholarships for worthy students and swift punishment for charlatans and pseudo-doctors.

Lang's epistles stamp him as both a practical physician and a man of great learning. He had evidently studied most thoroughly the writings of Hippocrates, Aetius, Galen, Celsus, Paul of Aegina, Avicenna, Mesue, Averrhoes and Dioscorides, to mention only a few of the ancient authors he quotes most frequently. Among his more immediate predecessors and contemporaries we note quotations from Peter of Abano, Giovanni di Vigo, Antonio Benivieni and Girolamo Fracastoro. Indeed Lange's epistles although they sparkle in places with their author's originality are a bit topheavy from the weight of the authorities he has amassed to support his contentions. Lange refers several times to Theophrastus but it is he of Eresus, not his contemporary Theophrastus von Hohenheim, better known as Paracelsus. Indeed Lange seems to either be entirely unaware or else deliberately ignored this new ferment in German medicine, but Lange was a traditionalist deeply rooted to the past. Yet Johannes Lange as he reveals himself in his book was withal a physician as well as a learned scholar and if he seems at times fettered by his excessive devotion to the medicine of antiquity yet it was probably a wholesome reaction in a land filled with empirics and urine casters and with surgeons who had never heard of a trephine.

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DR. CHARLES CALDWELL
(1772-1853)

By A. H. BARKLEY (HON.) C.M., M.D.

LEXINGTON, KY.

IT matters not what one's opinion of what qualtities constitute human greatness, the possession of any one of which is an undisputed passport to distinction. An active brilliant mind, a heart full of honest throbs, noble impulses and unremitting diligence, when concentrated in the same individual, constitutes a type of person rarely found, but universally acknowledged to deserve the highest praise, and whose claim to this high position can not be wisely questioned. Whether viewed as a loyal citizen, a man of science and extensive learning, or simply as an active member of the medical profession, the subject of this sketch deserves a permanent place among the galaxy of medical giants who have long since passed to their reward.

Dr. Charles Caldwell was born May 14, 1772, in Caswell County, North Carolina. His parents were Irish, and very poor. Caldwell worked on the family farm when a boy, and thus assisted his father in supporting the large family. His parents were exceedingly pious and had visions of Charles becoming a minister in the Presbyterian Church, though he himself had a leaning towards the legal profession. At an early age he erected on his father's farm a log hut in which he spent most of his spare time in study, as his parents, in anticipation of his becoming a minister, had released him from farm duties. At the age of twelve we are told he had gained a fair knowledge of the ancient languages, was well advanced in books and at the age of eighteen he was in charge of a grammar school. A very precocious youngster he must have been.

He had a fondness for debating and early in life took part in debates, discussions and mental contests, and with his disposition and literary talents had a propensity to array himself in a debate on the wrong side in order that he might produce a discussion by his advocacy of a paradox and to make a display of his ingenuity and ability in defense of error.

Caldwell was a man of many redeeming features, though he had many peculiarities which later, at times, estranged him from his associates. He was positive in speech, refined in manners, very distant, and exceedingly punctual in keeping his engagements.

While still a young man and during stay in Sailsbury, he had one of his fondest wishes gratified, meeting General Washington. He says:

> During Washington's stay in Sailsbury, I was much around his person, in the capacity of junior master of ceremonies, and again when the General left Sailsbury on his way north, after his tour of some of the southern states, I again, at the head of a new and larger escort, attended him to Guilford Courthouse. Having paid to him, at the head of my little squadron, the farewell ceremony in military style, and being about to issue the command to move forward,

Washington beckoned me to approach him. Having eagerly advanced to within a suitable distance, he bowed in his saddle, and extended to me his hand.

After pursuing his studies for a while, he came to the conclusion that he was neither suited to the ministry nor adapted to the practice of law, so somewhat against his own judgment he decided to study medicine. Possessed of what funds he had accumulated through his own efforts, and from the sale of a small portion of his father's estate, he determined to fit himself for the arduous labors which were ahead in his chosen profession.

He entered the University of Pennsylvania Medical School in October, 1792, and after two years of close application he received his medical degree.

During his residence in Philadelphia he made many friends, also many enemies. Among the many men he admired and was friendly with was Dr. Benjamin Rush, though later through some misunderstanding he became estranged from him, thereby losing the much coveted chair in the faculty to which he would have been elected had it not been for the sarcasm he indulged in against Dr. Rush.

While he was attending lectures in 1793, Philadelphia found itself in the grip of a terrible epidemic of yellow fever, which was most desolating from its destruction of human life, and temporary banishment of a large portion of the inhabitants, and revolutionary from its influence in producing for a very protracted period, no inconsiderable change in certain kinds of commerce and business of the city.

The family in whose house Caldwell was residing became alarmed and forthwith left the city. He found another place, and in a little while this family left for the country. This being repeated several times, Caldwell was in despair, and confided his plight to Dr. Rush. He told the latter that he desired to acquaint himself with the symptoms and course of the epidemic, and Dr. Rush wrote the following: "Mr. Caldwell the bearer of this note, is desirous of becoming an aid in the City Hospital, and he is well qualified as he is willing to perform the duties of the place." Benjamin Rush.

Within an hour after receiving this note Caldwell was busily engaged in his new occupation. He says:

> And from the first moment of my entrance on it, my engagements and duties were as abundant and pressing as they were melancholy and momentous. In my capacity as a medical assistant, I was alone; for, as yet, no other pupil had tendered his services. The nurses were few and inexperienced, and the provisions and arrangements in all respects limited, crude, and insufficient for the occasion. The hospital was large, several rooms of it were already filled with the sick and dying; patients in a like condition were hourly arriving from the sickly portions of the city, and with a frequency not much inferior, the dead were leaving it on their passage to the grave. No apartments being yet prepared for the use and accommodations of the medical assistants, I was obliged to eat, drink and sleep (when indeed I was permitted to sleep), in the same rooms in which I ministered to the wants of the sick. And not only did I sleep in the same rooms with my patients, but also at times on the same bed. To such an extent and in so striking a manner was this the case, that, when exhausted by fatigue and want of rest, I repeatedly threw myself on the bed of one of my patients, either alongside of him, or at his feet, and slept an hour or two, on awaking I found him a corpse. At other times. under similar circum-

stances, I have received from the patient, on some part of my apparel, a portion of the matter of "black vomit." These facts I mention, to show the risks I incurred of suffering by contagion, and indeed, the utter improbability, not to say, the impossibility, of my having escaped it, had the disease been contagious.

Thus did Caldwell clearly prove the difference in this disease between contagion and infection; his conclusions, however, were questioned by the leading authorities of the day, especially by Dr. Rush, who later saw his error and acknowledged the correctness of Caldwell's views.

Caldwell was deeply interested in all branches of science, especially horticulture. On one occasion while visiting a patient his attention was called to the tardy development of a tropical plant, he at once began experiments which were later crowned with success. He was the first person in Philadelphia and among the first, if not the first in this country, to conduct successfully the experiment of artificially stimulating the growth of plants, more especially blooming flowers. For this purpose he used warm air, warm water, camphor, asafoetida and other volatile alkali. He says: "These substances I applied to flowering buds or rather to the branches or stocks which bore them, these never failed to expand with the utmost rapidity, and to exhibit evidence of the highest degree of life and vigor." Dr. Barton of Philadelphia claimed priority to the experiment but could not substantiate his claim.

In 1794 in the western part of Pennsylvania much whiskey was being made; the government in order to derive some revenue placed a tax on it that was most unacceptable. The defiance of this tax resulted in armed rebellion. Fifteen thousand troops, by order of General Washington, took the field to suppress it; Caldwell offered his services, which were accepted, and he served as brigade surgeon throughout the campaign, at the conclusion of which he was honorably discharged.

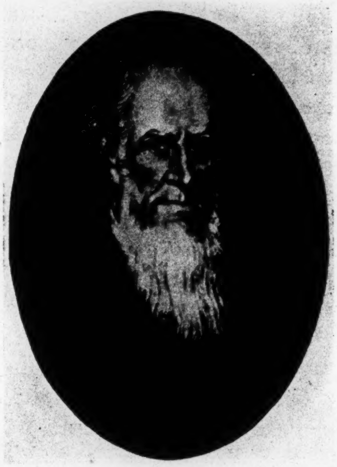

FIG. 1. CHARLES CALDWELL (1772–1853).

No one better than Dr. Rush knew Caldwell's mental grasp and literary attainments. Rush had received from London a first edition in Latin of "Blumenbach's Physiology." He was anxious to have his students use it as a textbook, so he selected Caldwell to translate it into English which he did correctly and with dispatch.

In 1812 this country declared war against Great Britain, and at that time there was but one publication, well calculated to be the chronicle of the stirring events that were to follow. This periodical, *The Port Folio*, was published in Philadelphia by Nicholas Biddle who had just retired. In casting about for a suitable successor to this distinguished editor, Caldwell was finally selected, and entered upon the duties of editorship with his accustomed zeal. His efforts were crowned with such success that it called forth the highest commendation by those best able to judge.

While busily engaged in the practice of medicine in Philadelphia there arose the question of water supply for the city. This precipitated a long and bitter controversy, due mainly to those residents and physicians who had a personal interest, and also from the common belief of the "domestic origin of yellow fever." Into this fight Caldwell threw himself with all the force he possessed and the final result was the bringing into the city of water from the Schuylkill river. He later received many compliments for his efforts and no small share of the credit for the consummation of the enterprise.

While a member of the Philadelphia Medical Society he was selected to deliver a eulogy on Dr. Wistar, recently deceased. Dr. Horace Holley was among those present, and it was on this occasion they met for the first time. Holley told Caldwell he was on his way to Lexington, Kentucky, to assume the duties of President of Transylvania University. He was much impressed with Caldwell's address and wide range of knowledge, and it was largely through his efforts that Caldwell in August, 1819, while in the midst of the delivery of a course of lectures on Philosophy of Natural History, received from the Board of Trustees of Transylvania University his appointment to a professorship in the medical department. The chair he was to occupy was that of the Institutes of Medicine and Clinical Practice. Caldwell accepted this offer and after a residence in Philadelphia of many years came to Lexington, Kentucky, the following November and entered upon his duties.

Caldwell in 1821 was commissioned by Transylvania University to go to Europe and France and purchase books for the library; for this purpose the sum of $13,000 was placed in hand.

After about ten weeks' hard traveling and suffering many delays he reached Liverpool where he took stage for London. On this stage trip an incident occurred that impressed Caldwell with the importance of using more caution and policy in his speech to others. Shortly after leaving Liverpool they passed a very beautiful villa. He inquired of a lady passenger to whom it belonged, and she, without disclosing her identity, informed him it was the home of Dr. Solomon, the maker of the celebrated health restorer, "Cordial Balm of Gold," "What," said I, "to Dr. Solomon the Israelitish King of quacks and imposters. He has really picked the pockets and drugged to death the good people of England to some purpose. He served them as they deserved, for allowing themselves to be duped by such an impudent, cozening, letterless knave." The lady listened to the doctor and finally disclosed to him the fact that she was Mrs. Solomon, wife of the man of whom he had recently spoken. Needless to say Caldwell felt much chagrined at his unbridled utterances.

While in Liverpool he met Mr. Roscoe, the author of the "Life of Lorenzo de Medici" and of other able and celebrated works. Through Roscoe he met in London Dr. Bostock, a gentleman of scientific and literary standing, also Sir Astley Cooper and Mr. Abernethy, both of whom he admired more for their professional skill than for their scientific knowledge and literary attainments.

He left England in March, 1821 for Paris.

> My object in visiting Paris was of no common order. The ravages of the French Revolution had not yet entirely passed away. The libraries of the wealthy and literary persons had by this time found their place on the bookseller's shelves. No sooner was I apprised of the whereabout of those little valued, yet at times very precious repositories, than I procured permission to make my way into them and ascertain of what they consisted, for several weeks they occupied my whole time. The professional, literary, and scientific characters with whom I held intercourse were the professors of medical schools generally, and the superintendents of public institutions, also, Cuvier, Dupuytren, Baron Larrey, and Alibert. The personages to whom I was chiefly indebted for introductions to gentlemen of distinction, were the Marquis de Lafayette, his son, George Washington de Lafayette, Marshal Grouchy.

Caldwell returned to this country after a stormy voyage of fifty-two days, and at once set out for Kentucky, arriving in Lexington without further mishap some weeks later after an absence of eight months; the books he purchased came a little later in good shape, and are now a part of the famous Transylvania Medical Library.

He resided in Lexington eighteen years, and while here he was not only connected with Transylvania Medical School, but gave public lectures on various and timely subjects, also took an active interest in all civic movements. When anything of especial interest was to take place, such as the entertainment of distinguished guests, the celebration of an anniversary or other unusual happenings, he was always called upon to take a conspicuous part, as when the Lexington and Ohio Railroad, which is now the L. and N. R. R. between Lexington and Frankfort, was built in 1831, Caldwell was the principal speaker at the inspiring ceremony of laying the first stone sill, which took place on Water Street in Lexington, on October 21, 1831, amid a great concourse of distinguished citizens and guests. An interesting sketch of this memorable occasion says:

> The imposing ceremony of laying the first "stone sill" took place on Water Street October, 21, 1831. Indeed it was made a very great occasion which might have been marked with still greater pomp and circumstances, as the newspapers inform us, had more notice been given beforehand. As it was, a large procession, civic and military, was formed, marshaled by Gen. Leslie Combs, the renowned boy captain of 1812, assisted by handsome Jas. B. Coleman. Three military companies, including Hunt's Artillery and Captain Neet's Rifle Guards, were on parade, with a fine military band playing "Yankee Doodle," "Hail Columbia," and other patriotic airs.
>
> Major-General Pendleton and staff on horseback led the march. Governor Metcalfe and Rev. Nathan H. Hall supported the orator of the day—Dr. Charles Caldwell. Dr. Caldwell then delivered a highly interesting and appropriate address. He spoke in polished and eloquent phrase of the advantages accruing to Lexington and the whole adjacent country from the establishment of this railroad.

While a resident of Lexington he frequently lectured on phrenology, and claims to have been the first to introduce it in the United States; also, the first public and practical advocate of mesmerism in the Mississippi Valley. He looked upon the human brain as a multiplex viscus; this was further strengthened after his acquaintance with Gall and Spurzheim, whom he later met in Paris. He says this view made him a ready victim to the science of phrenology. Being a friend of and physician to Henry Clay, the two often discussed this interesting subject. Clay in one of his speeches in the United States Senate on the Poindexter Resolution, referred to his friend and physician, Caldwell, as follows:

> A new philosophy has sprung up within a few years past, called phrenology. There is, I believe, something in it, but not quite as much as its ardent followers proclaim.
>
> According to its doctrines, the leading passions, propensities and characteristics of every man are developed in his physical conformation, chiefly in the structure of the head. Gall and Spurzheim, its founders or most eminent propagators, being dead, I regret that neither of them can examine the head of our illustrious Chief Magistrate [Andrew Jackson]. But, if it could be surveyed by Dr. Chas. Caldwell, of Transylvania University, I am persuaded that he would find the organ of destructiveness prominently developed.

Caldwell made a vain attempt to remove the medical college from Lexington to Louisville, and would have succeeded had he not met with strong and determined opposition from members of the faculty and prominent citizens. In 1837 in company with John Esten Cook and L. P. Yandell, he went to Louisville, where all were given chairs in the Louisville Medical Institute, out of which grew the Medical Department of the University of Louisville.

Dr. Caldwell was a member of the medical societies of Philadelphia, as well as those of importance in the West, also the American Philosophical Society and other learned bodies, in all of which he took an active part. He was a most voluminous writer, embracing a wide range of subjects, historical, legal, religious, medical, travel, philosophical, poetical and many others on special topics. As a colloquist, he had few equals and no superiors.

The great confidence which his professional brethren reposed in his judgment was evidenced by the frequency with which they resorted to him for advice in consultation. In the latter part of his life this constituted a large part of his practice. And in this intercourse with other physicians, while he never concealed his sentiments for reason of policy, or appeared to acquiesce in what he really disapproved for fear of infringing on the laws of politeness, yet he invariably treated all with candor and becoming deference.

The life of Caldwell was one closely devoted to knowledge and its promulgation. He was a prodigious reader, and his love of books was a prominent passion with him; no medical man of his time surpassed him in philological pursuits, and in the acquisition of languages. He was a classical scholar and ready with citations from the most approved writers in a number of languages, both modern and dead.

His life as we have seen was from its very outset one requiring the active, energetic exercise of every power, both of mind and body, at first from necessities of his condition, and subsequently continued, partly from the force of habit, but in part, also, from the aspirations of a laudable ambition. He spent the declining years of his life almost exclusively in his study surrounded by his family. His manners were courtly, he was a man of high sense of honor.

He died in Louisville, Kentucky, July 9, 1853, of an attack of erysipelas, from which he failed to rally at the advanced age of eighty-one.

LA FAYETTE GUILD*

By EMMETT B. CARMICHAEL, PH.D.

UNIVERSITY, ALABAMA

THE name of Guild has been associated with the medical profession of Alabama for more than a century. And there have been few such striking and illustrious characters as Doctor La Fayette Guild, who, while comparatively a young man, was called by General Robert E. Lee to be Surgeon and Medical Director of the Army of Northern Virginia. It has been stated often that of the medical profession of the whole South, he attained the greatest distinction during the Civil War.

His father, Doctor James Guild (1799–1884), was born in Virginia and then moved to Tennessee. He was the son of Major Walter and Elizabeth (Conn) Guild, the former a native of Scotland who came to America about 1780, settling in Sumner County, Tennessee. Dr. James Guild moved to Tuscaloosa in 1821, three years after Tuscaloosa County was formed. Dr. Guild had recently graduated with the degree M.D., from Transylvania University, Lexington, Kentucky. He practiced his profession continuously for sixty-three years. Dr. James Guild was a distinguished surgeon and became renowned for his skill and success in the removal of stones from the bladder.

In 1824, General La Fayette came to America to pay his respects to the people whom he had helped in their fight for independence. Alabama was included in his itinerary, and it was during April of 1825 that he visited this state. La Fayette was given a most courteous reception by the governor and people of Alabama. It has been a custom in this country to name children for heroic characters. Doctor James Guild gave the name La Fayette to his second son, born November 23, 1825. Of those who have been given this name, none has been more kindly or chivalrous to his fellowmen, and at the same time so steadfast in his convictions than has La Fayette Guild.

Of La Fayette Guild's childhood, we have very few records. His father owned a large tract of land on the outskirts of Tuscaloosa, which had shady groves and numerous brooks. It was while young La Fayette Guild was damming one of these small branches that he noted a layer of curious black stone. He took some of this black material to his father, who had it examined and found it to be coal. It is a tradition that this was the first finding of coal in this district.

La Fayette Guild grew to manhood and pursued his studies at the University of Alabama. He was an energetic student and found time for college activities. He was an officer from 1844 to 1846 in one of the debating and literary societies of the University, the Erosophic. He gave an address in 1844 and another in 1845 before this organization. These addresses[1] were acceptance speeches acknowledging the honor that the members of the society had conferred upon him. In 1845, he received the degree A.B. and in 1848, the degree M.A. from the University of Alabama. He read medicine under the direction of his father, and entered Jefferson Medical College, graduating in 1848 with the M.D. degree. Doctor Guild spent some of the following year as a private pupil, studying under Doctor Phil Aylette of New York.

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* Read at the Meeting of the Tuscaloosa County Medical Society, Tuscaloosa, December 11, 1933.

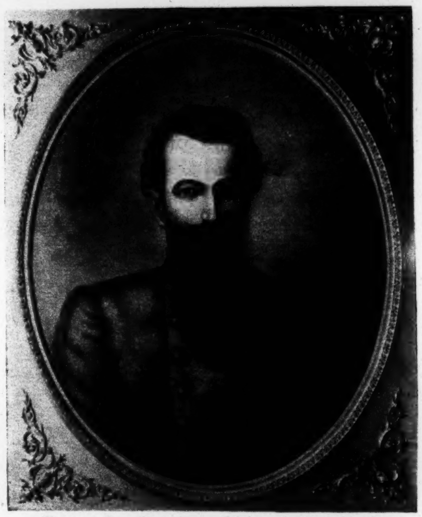
FIG. 1. LA FAYETTE GUILD (1825–1870).

Just as his inherited tendencies led him to study medicine, so his love of adventure led him to select the U. S. Army for the practice of his profession. He enlisted on March 2, 1849, and was given the rank of assistant surgeon. His first assignment was to Key West, Florida. Later he was stationed at Fort Barrancas, Florida, for a while. It was while he was at this army post that he became associated with Captain Josiah Gorgas, who was mounting heavy artillery at Fort Pickens, and who later held the rank of General and Chief of Ordnance in the Confederate States Army. Doctor Guild became very fond of Captain Gorgas's little son, William Crawford Gorgas. He often bathed him, and called the attention of his fellow officers to the little Hercules who later on became renowned for his work in the eradication of the dreaded yellow fever from Cuba and the Panama Canal Zone.

During Doctor Guild's stay in Florida, he fell in love with the beautiful and charming Martha Aylette Fitts, of Mobile, Alabama. She was the niece of the celebrated Doctor Aylette, with whom Doctor Guild had studied following his graduation in medicine. They were married in 1851, and their union proved to be a happy one. Mrs. Guild shared with him the hardships of army-post life at all times. When Lee's Army was retreating just previous to the end of the conflict, she was with her husband, and was the only woman present. This incident alone shows how much General Lee esteemed and respected both Doctor and Mrs. Guild.

After a few years in Florida, Doctor Guild was transferred to Governor's Island to serve as assistant Surgeon and Quarantine Inspector. In 1856, while he was at this station, he wrote an article, Report on Yellow Fever at Fort Columbus, N. Y., which was published by the U. S. Government. As can be seen from the following quotations, this paper supported his idea that yellow fever was infectious:

> 1. . . . but that its origin was in our vicinity, either on shipboard or on land, and that its causes, whatever they are being thus eliminated in our neighborhood, were wafted to us by the winds.

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[1] These addresses were written in long hand and are preserved in the Archives and History Department at Montgomery.

2. The first case that occurred in this harbor last summer was on board of a vessel; and not only did one vessel arrive in this port with the disease on board, but several; and they were all collected and placed in quarantine, whence, in my opinion, the disease was disseminated throughout the different places along the bay that were not protected from the winds that swept over this congregation of infected ships, filling the air with their pestilence.

3. I believe yellow fever to be of the same family of diseases as ordinary remittent fever, yet not the same or an aggravated form of the same disease. They are both of malarial origin, generated by the decomposition of organic matter, alike communicable to individuals only by their being exposed to the morbific elements as they arise from the prime source of the disease, and incapable of being communicated by simple contact with the patient suffering with the disease, or with the effluvia arising from his body or from his clothing.

4. If I have established the fact that yellow fever was communicated to Governor's Island from the Quarantine, and that the morbific elements were wafted by the winds seven or eight miles, would it not become a question of the most vital importance to determine the extreme distance to which these elements of disease may be disseminated by the wind?

This new theory on the causation of yellow fever was tested and proved to be correct by Walter Reed and his associates in 1900 and 1901 in Cuba, when they found that this disease was spread by means of the bite of the mosquito, *Stegomyia fasciata.* They also confirmed Doctor Guild's views that the disease could not be transmitted by contact with the patient or his excreta.

From Governor's Island, Dr. Guild was sent to the Pacific Coast, where he served at several places. He witnessed many trying scenes of Indian warfare while he was in this section of the country. Following one of the Indian raids, Doctor Guild found a little Indian girl strapped to her dead mother's back; she was the only living creature around. The wail of this little papoose from the ravine attracted Doctor Guild's attention, and he took her to his home and had her cared for. Since the little girl was found in a ravine, he immediately gave her the name of Ravina. He also took another Indian child, a boy, into his home to rear. Doctor and Mrs. Guild had no children of their own, but gave the two little Indian children a home and an education.

Just previous to the Civil War, Doctor Guild was stationed in the State of Oregon, attached to the famous 2nd cavalry regiment, U. S. Army, of which Albert S. Johnston was colonel, Robert E. Lee was lieutenant-colonel, and to which Fitzhugh Lee was attached. The feelings between the states were becoming quite tense, so Doctor Guild resigned his post July 1, 1861, and returned with his wife and the two Indian children to Tuscaloosa to visit with his family. While there, he decided to enlist in the cause of the Confederacy, and immediately went to Richmond, where he was appointed as surgeon, Medical Department, Confederate States Army, on July 19, 1861, to take rank from March 16, 1861. An order dated August 7, 1861, shows that Surgeon Guild was appointed Inspector of Hospitals. This position brought him into close contact with General Joseph E. Johnston, whom he thought was among the greatest strategists of either army.

It was at the battle of Seven Pines that General Johnston was wounded, May 31, 1862, and two days later Robert E. Lee succeeded him as commanding general. One of the first inquiries of General Lee was: "Where is Doctor Guild? Tell Him to report to me in person." It was on the battlefield of Seven Pines, June 27, 1862, that Doctor La Fayette Guild was given his commission as Surgeon and Medical Director of the Army of Northern Virginia, which post he held with honor to his profession and his country until the surrender at Appomattox Court House, Virginia, April 9, 1865. This position placed Doctor Guild on Lee's staff, and from that time until the end of the conflict, he sustained the closest personal relationship with the great Southern general. The following incident which occurred during the war illustrates the feeling and respect that Lee had for the members of his staff. While General Lee was invading Pennsylvania, he rode through a town at the head of his troops, and the people of the town gave every demonstration of hostility to the Confederates. From the windows and balconies of the homes, the women waved flags and accompanied their demonstrations with hissing and jeering. From all this the delicate and sensitive nature of Lee shrank, and turning to one of his aides, he said: "Bring Doctors Guild and Breckenridge to the front." General Lee placed himself between them, and they rode abreast through the town without further protest. With characteristic modesty, General Lee later explained his reason for summoning the two gentlemen to the front was that he felt sure that the ladies would not ridicule two such handsome men and such splendid horsemen. This incident was an acknowledgment by Lee that Doctor Guild had a pleasing face and figure as well as a charming personality. Those who knew Doctor Guild remembered him as being of average height and slender.[2] The two portraits of him now in existence show him as wearing a heavy black beard.

The War Department's records concerning the Civil War are not complete in any sense, but we are greatly indebted to that department for preserving as many letters, papers, and reports as it has. Many of these letters and reports were written by Doctor La Fayette Guild or refer to him and are to be found in the following series: *War of the Rebellion. Official Records of the Union and Confederate Armies.* The first letter by Doctor Guild which is listed in this set of works was dated July 5, 1862. This was eight days after he had received his commission as Surgeon and Medical Director of Lee's Army, and it shows how readily he assumed the responsibilities of his office. I shall quote an extract from this letter and from several of the others, because they illustrate the trials and successes that he had.

> Camp near Malvern Hill Battle-field,
> July 5, 1862.
>
> The Surgeon-General:
>
> Sir: . . . I was delayed here in consequence of the great difficulty in removing our wounded to Richmond. When their removal was nearly accomplished General Lee ordered that I should give assistance to the Federal medical officers in concentrating their sick and wounded at some central point, where surgical aid could be more efficiently rendered and where provisions and other necessaries could be issued. . . .

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[2] Mrs. Temperance Hawkins, of Birmingham, who was Mrs. La Fayette Guild's sister; Judge Henry Jones of Tuscaloosa.

I am, sir, very respectfully, your obedient servant,
L. Guild.
Surgeon, C. S. Army
Medical Director, Department of Northern Virginia.

From this letter it is evident that Doctor Guild not only cared for the Confederate sick and wounded, but that he also supervised the care of the captured Union soldiers. His word was final as to whether the wounded Union soldiers would be paroled and returned, which in itself was a very responsible duty. A second letter by General Lee, which was sent to Major General John Pope, also illustrates the activities of Doctor Guild.

Headquarters Army of
Northern Virginia,
August 31, 1862.

Major General John Pope,
U. S. Army, Commanding, & c:

Sir: Consideration for your wounded induces me to consent to your sending ambulances to convey them within your lines. I cannot consent to a truce or a suspension of military operations of this army. If you desire to send for your wounded, should your ambulances report to Dr. Guild, medical director of this army, he will give directions for transportation.

The wounded will be paroled, and it is understood that no delay will take place in their removal.

I am, respectfully, & c.,
R. E. Lee,
General.

The sincerity and honesty of purpose of Doctor Guild could not have been better demonstrated than when the Medical Inspector, U. S. Army, Richard H. Coolidge, spent the night in his camp on the battlefield. The following letter by Coolidge to the Surgeon-General of the U. S. Army is quite explanatory.

Washington, D. C.,
September 11, 1862.

General: . . . Medical Director Guild also wrote to his commanding general, and the two letters were sent forward that night by a special courier. The reply received by Medical Director Guild . . . directed Medical Director Guild to furnish subsistance for our wounded as far as possible, and gave the route for our ambulances to take in going out, viz, by Centerville. . . . Although doubtful of the propriety of doing so, I accepted the invitation to pass the night with Medical Director Guild at his camp on the battlefield. . . .

Richard H. Coolidge.
Medical Inspector, U. S. Army.
The Surgeon-General of the Army.

The task of keeping adequate ambulance and field hospital service with the Army of Northern Virginia was one of the most stupendous of the war, but that was only a small part of Doctor Guild's work. This fact is emphasized in a letter by General Lee to President Davis.

Headquarters Army of
Northern Virginia,
Hagerstown, Md.,
September 13, 1862.

His Excellency President Davis,
Richmond, Va.:

Mr. President: . . . Dr. Guild, the medical director, with detachments from each brigade, was left upon the field and all the wounded committed to his care. All the means of transportation at our command were given to him. . . .

With sincere wishes for your health and prosperity, I am, most respectfully and truly, yours,
R. E. Lee,
General.

The last statement in the letter to Doctor S. P. Moore, Surgeon-General, C. S. Army, touches upon Doctor Guild's philosophy of life.

Camp near Winchester, Va.,
October 9, 1862.

Dr. S. P. Moore,
Surgeon-General C. S. Army,
Richmond, Va.

Sir: . . . As you are doubtless aware, many of our sick and wounded have been paroled by the enemy's cavalry, an expedient resorted to by them to get an equivalent for their men captured in battle. . . . Hospitals in the rear have been entered and patients paroled who were reported to be *in articulo mortis.* However, I presume everything is fair in war. . . .

I am, sir, very respectfully, your obedient servant,

L. Guild,
Surgeon and Medical Director
Army of Northern Virginia.

Due to the lack of certain foods in the diet, the Confederate soldiers often showed signs of scurvy. Doctor Guild in a second letter to Doctor S. P. Moore pointed out that the diet was not balanced and that certain foods should be procured, especially antiscorbutics.

Medical Director's Office,
Army of Northern Virginia,
January 9, 1863.

Dr. S. P. Moore,
Surgeon-General, C. S. Army.

Sir: . . . I believe our exemption from a fearful epidemic of smallpox is owing to our present mode of life, viz, bivouacking in the open air. When we go into winter quarters, I fear the health of the troops will not remain so good. There is a tendency to scorbutus throughout the whole army. Unless there is an increase of the vegetable portion of the ration, scurvy must make its appearance. None of the component parts of the ration, except flour and unsmoked bacon, with beef occasionally, of inferior quality, are issued. Vinegar and potatoes are absolutely necessary for the maintenance of the health of the troops, and I would most respectfully request you to impress it upon the Subsistence Department that our next campaign may be a disastrous one, simply for the want of antiscorbutics. . . .

I am, sir, very respectfully, your obedient servant,

L. Guild.
Surgeon and Medical Director of the
Army of Northern Virginia.

One of Doctor Guild's greatest achievements was that of handling the sick and wounded after the Gettysburg Campaign. A less efficient medical staff would have meant the loss of thousands who lived to make the last stand around Petersburg. In a report to Surgeon-General S. P. Moore, he explains how he cared for the sick and wounded following the campaign.

No. 427.

Report of Surg. La Fayette Guild, C. S. Army, Medical Director, with Return of Casualties in the Army of Northern Virginia.

Medical Director's Office,
Camp near Culpepper Court-House,
July 29, 1863.

Sir: . . .

On July 15, we encamped near Bunker Hill, 12 miles north of Winchester, and remained there until the 21st, refreshing the troops and moving to the rear our sick and wounded from Winchester and Jordan Springs, at which place I found 4,000 sick and wounded, steps for their removal to Staunton being immediately taken. All who could bear transportation were gotten off at the 22nd instant, less than 150 remaining at the two places. . . .

I am, sir, very respectfully, your obedient servant,

L. Guild,
Medical Director, Army of
Northern Virginia.

Surg. Gen. S. P. Moore,
Richmond, Va.

After the cessation of hostilities and after the soldiers had laid down their arms at Appomattox, Doctor Guild returned to his native state, Alabama. He went to Mobile, his wife's home, and started as a private practitioner of medicine. Because of his proficiency in the practice of his profession during the recent conflict and because of his knowledge of medicine, he was destined for further public service. Soon after his arrival, the appearance of yellow fever was noted in the city. Doctor Guild accepted the post of Quarantine Inspector for the Port of Mobile in 1866, and led the fight against the dreaded disease. So great had been Doctor Guild's labors during General Lee's many strenuous campaigns that he found his health broken. He resigned from his new duties at Mobile in the fall of 1869, so that he could move to California.

Dr. Guild's scientific and professional attainments were recognized by his associates since they conferred upon him Honorary Membership in the Mobile Medical Society in 1870.

Soon after his arrival in San Francisco, he was elected visiting surgeon of the City and County Hospital. He continued his practice of medicine until the early part of the summer of 1870, when his old trouble, which was diagnosed at that time as rheumatism of the heart, became worse. He was persuaded to visit at the home of a friend in Marysville, California, with the hope that the climate would be beneficial. Doctor Guild's condition grew worse, and he died at his friend's residence on July 4, 1870.

His remains were returned to Tuscaloosa, and now lie at rest in Evergreen Cemetery.

TRIBUTE OF RESPECT

To the Memory of Dr. La Fayette Guild
by the Board of Health of
San Francisco.

At a meeting of the Honorable Board of the city and county of San Francisco, held this day, a committee consisting of J. Campbell Shorb, M.D. and Gustavus Holland, M.D. was appointed to draft appropriate resolutions on the decease of La Fayette Guild, M.D., late visiting surgeon of the City and County Hospital; and in pursuance thereof the following preamble and resolutions were unanimously adopted:

Whereas, It has pleased Almighty God to remove from our midst and a sphere of usefulness, Dr. La Fayette Guild, an amiable gentleman, accomplished physician and surgeon, and valuable citizen, and,

Whereas, It is highly right and proper that the Board of Health should in fitting terms express their high appreciation of his worth, therefore be it

Resolved, That in the death of Dr. La Fayette Guild, the Board of Health are profoundly impressed with a loss to ourselves and to the community, of the services of one in every respect eminent and estimable.

Resolved, That the heartfelt condolence of the Board of Health follow his afflicted family and friends to their far home in the south where well-known and beloved, his death will cause the deepest sorrow.

Resolved, That this tribute to his memory, this sincerely felt but inadequate commemoration of the many excellent qualities of his mind and heart be spread upon the minutes of the Board, be published in the daily papers of San Francisco and a copy of the same be forwarded to his family and friends in Alabama.

Present—His Honor THOMAS H. SHELBY,
Mayor and ex-officio President
of the Board of Health.
GUSTAVUS HOLLAND, M.D.
H. H. HUBBARD, M.D.
H. H. TOLAND, M.D.
J. CAMPBELL SHORB, M.D.

Attest: WILLIAM V. WELLS, Clerk Board of Health.

Doctor Guild has been named as the man who can best typify the work of the Medical Corps of the Confederate Armies on the memorial to the Southern cause, which is being carved from the granite face of Stone Mountain, near Atlanta, Georgia. Dr. Guild was remembered by his former comrades as one of the most valiant of the Southern leaders for his battles to save the lives of General Lee's sick and wounded troups. Dr. E. D. Newton, Milledgeville, Georgia, Surgeon and member of the immediate staff of La Fayette Guild, and who was the last survivor of that staff, wrote several articles on the Medical Department of the Army of the Confederate States for the *Southern Practitioner*. The following quotations from Doctor Newton's writings illustrate how Dr. Guild's staff respected him: (1), "I am glad to know that Dr. Guild was my intimate friend as well as superior officer," (2), "What a noble man Dr. Guild was, . . . " and (3), "We have already spoken of Dr. La Fayette Guild, one of the noblest men I ever knew, ..."

Major Henry E. Young, Judge Advocate General, of Lee's Staff, wrote the following tribute to Doctor La Fayette Guild in 1909 while living at Charleston:

> When I joined Gen. Lee's Staff, I found Dr. Guild a member of it and as head of the Medical Department of the Army with the distinguished assistance of Drs. Breckenridge, Wingfield, Wingate, and Geddings. Efficient in all he did, Dr. Guild made his department one of the most effective. Urbane and yet firm, he spread around him an air of politeness and courtesy, but required exact discharge of duty.
>
> No sick or wounded soldier ever failed to feel the effect of his active and kind influence. The fact that during the time he was in charge of the Medical Department of the Army of Northern Virginia, he enjoyed the confidence and esteem of General Lee and his fellow officers, is the best proof of his lofty character and his high attainments, and his faithful discharge of duty.
>
> He wore without reproach the Grand Old Name of Gentleman.

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GERRIT PARMELEE JUDD, M.D.

SURGEON AND DIPLOMAT OF THE SANDWICH ISLANDS
(1828–1873)

By FRANCIS J. HALFORD, M.D.

HONOLULU, HAWAII

ON the cold bleak afternoon of November 3, 1827, the sailing vessel *Parthian* with forty persons aboard left Boston on its journey to the Sandwich Islands of the Pacific. Aboard were Dr. G. P. Judd and his bride of a few months. The course lay to the South, rounding Cape Horn and into the Pacific. The tediously long voyage of 18,000 miles on the slow sailing ship required 148 days and on March 30, 1828, the young surgeon approached Honolulu. Here his future life was to be one of great achievements spread over many fields.

Let us glance briefly into his earlier life. Born in Paris Hill, N. Y., April 23, 1803, Dr. Judd attended medical lectures at Fairfield, N. Y. for four years. He graduated at the age of twenty-three and entered a partnership with his father who also was a physician. In a short time the spirit of self-sacrifice and faith in God's promises urged the young doctor to apply to The American Board of Foreign Missions. They accepted his desire to serve in the Islands and with his bride, aged twenty-three, the journey began.

Medical Services

Stationed in a frame building with other missionary families his efforts to serve God were numerous. Travel to the sick might include an open voyage by canoe to remote parts of the islands, other times by foot through dense forests. Narrow trails substituted for roads, some of which coursed at the edge of steep cliffs. One family at Waialua, a distance of 40 miles, sent a Hawaiian rider on a hurried call to the doctor. It was night and pitch dark—the call demanded immediate attention! To avoid being lost the doctor tied a white shirt to the tail of his messenger's horse, mounted his own horse and ordered the boy to ride ahead.

Several times, he received calls from various Islands at the same time; the case that seemed most urgent received his attention. Such calls would consume one to two weeks should there be a calm at sea. Some days he had to mix as many as twenty to forty prescriptions; other times, he had to be a combined cook, midwife, nurse and housemaid. "On one case of bleeding of the lungs, I stayed one week though it was unconfirmed consumption." Certainly, doctors were as cautious then as now!

Doctor Judd was stern, forceful and exacting; his hatred for hypocrisy is best shown while he writes. "The native doctors are a miserable set of quacks who often shorten the lives of their patients by their remedies." His affection for religious cheats is being described when a patient near death was given the final unction. The family were under the impression that the priest expected to cure her.

"This, I denied, and pledged myself to confront and expose him if he pretended to cure with his holy water; and I added that his motive in visiting the sick was to make proselytes and procure bodies to be buried in their new graveyard."

Cancer of the breast was recognized as such by this doctor as is shown by the following case studies. Kapiolani* was sent to Dr. Judd with a cancer, and without any anesthetic, surgery followed:

> She bore the operation which was severe without manifesting the least symptom of pain. Two other doctors who were present believed the disease was removed and we might expect a perfect recovery. The wound healed kindly and at the end of a fortnight was nearly closed. Six weeks after the operation, in preparation for leaving to visit Maui, she took a long walk in the heat of the day which brought a pain in her side. Erysipelas now made its appearance which after two or three days affected the brain by metastasis and she sank away into palsy and death.

Mrs. Lucy G. Thurston writes in detail of her breast amputation at the age of sixty-five:

> In the room there was a Chinese reclining chair, a table for the instruments, a wash stand with wash bowls, sponges and pails of water. There was a frame with two dozen towels and a table of choice stimulants and restoratives. The instruments were laid upon the table, strings were prepared for tying arteries, needles threaded for sewing up the wound. My shawl was thrown off, exhibiting my left arm, breast and side perfectly bare. Dr. Judd stood at my left elbow. The doctor with great firmness asked, "Have you made up your mind to have it cut out?" "Yes sir!" "Are you ready now?" "Yes sir!" "I am going to begin now." Then came a gash long and deep, first on one side of my breast, then on the other. I felt every inch of me as though flesh was falling. I had self control over my person and my voice. Every glimpse I happened to have was the doctor's right hand covered with blood up to the very wrist. He was nearly an hour and a half in cutting out the entire breast and the glands beneath the arm. The doctor said to me, "I want to cut yet more, round under your arm." I replied, "Do just what you want to do, only tell me so that I can bear it." One said the wound was more than a foot long. Eleven arteries were taken up, ten stitches were taken—two punctures to each stitch. The following morning the pain had ceased. Surgeons would understand the expression that the wound healed by a "union of the first

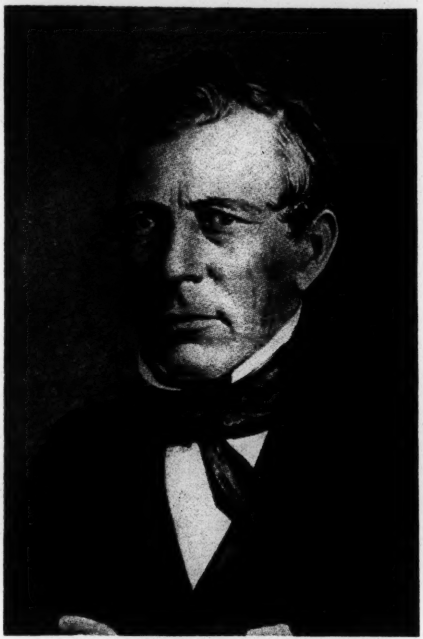

FIG. 1. GERRIT PARMELEE JUDD. DAGUERROTYPE ABOUT 1857.

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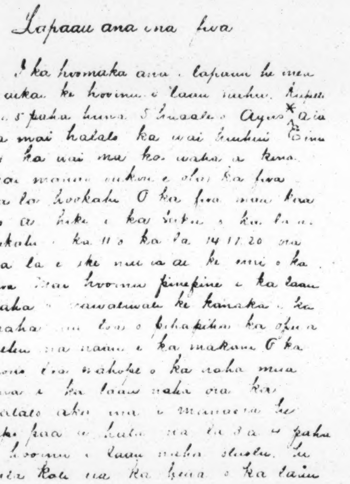
* Kapiolani was an early convert to Christianity and of royal blood. Shortly after conversion she went down into the active volcano Kilauea and openly defied Pele the Goddess of Fire, thereby denying the omnipotence of Hawaiian gods and idols.

intention." Three weeks later your father for the first time raised me very slowly to the angle of 45 degrees.



Lapaau ana ina fiva

FIG. 2. PAGE FROM DR. JUDD'S TREATMENT. BOOK WRITTEN FOR MISSIONARIES AND NATIVES IN OUTLYING DISTRICTS.

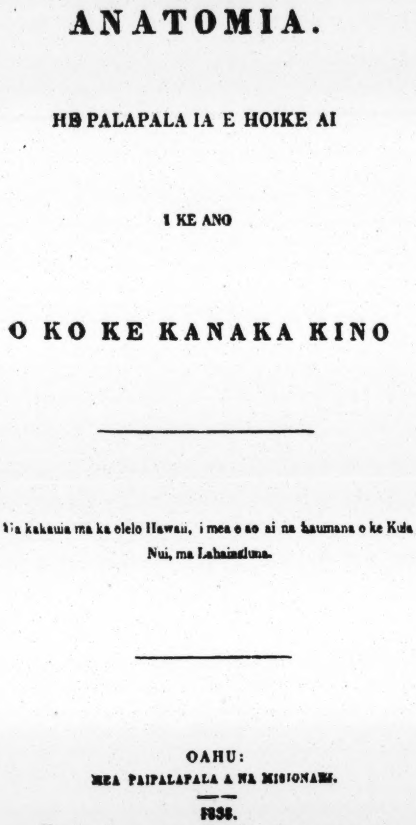
The operation was successful since the patient lived to be eighty-one years of age.

At the age of thirty, Dr. Judd writes in his diary:

> This morning visited Kamaunu who has been under my care with a tumor of the abdomen, which commenced in the right lumbar region and extended finally to fill all the lower part of the abdomen below the umbilicus. Yesterday he complained of much heat and pain, last night the abscess burst into the bladder and discharged per viam naturalem a quart of pus, and another quart in the course of the day; the tumor is about half reduced in size. [Probably an appendiceal abscess.]

In the two following cases the doctor undoubtedly was without the aid of a specialist:

> I performed the operation of depressing the cataract of an old man who has been stone blind these ten years. I suspect the retina has lost its powers and the operation will be of no avail. I tried to ligate a large polypus of the nose yesterday and it extended from the external nares to the top of the throat. Did not succeed for want of a good wire.



ANATOMIA.

HE PALAPALA IA E HOIKE AI

I KE ANO

O KO KE KANAKA KINO

Na kakauia ma ka olelo Hawaii, i mea e ao ai na haumana o ke Kula Nui, ma Lahainaluna.

OAHU:
MEA PAIPALAPALA A NA MISIONARI.
1838.

FIG. 3. COVER FOR DR. JUDD'S ANATOMY.

Many prints and sketches of the Islands together with other historical pieces are to be found in the Old Mission Home. Dr. Judd's medicine cabinet is on display there; even the bottles with oil of anise and oil of cinnamon still retain their original odor although over one hundred years old.

The bistoury and amputation knives with trephine drills, though rusted, are in good preservation. The collection recalls Dr. Judd's orthopedic work:

> A native came to me with two silver dollars, begging I would cut off his hand which has been diseased five years and become entirely useless. The disease appeared to be a malignant kind of ulcer which had affected the wrist, destroyed the thumb and nearly the forefinger and was spreading fast. I amputated it, assisted by Mr. Richards and Green and Capt. Morgan. There was a great crowd of common people about the yard, the operation was performed in the usual manner (expression 100 years old) and made a good stump. The house being very hot, it bled this afternoon. I changed the dressings and placed him in a cooler situation—no hemorrhage since. [Was this leprosy?]

Three sailors fell from the mainyard of a ship in the harbor:

> We found one lying just where he fell, his thigh fractured, the bone driven through the flesh, another with fracture of the ribs and the third much bruised. The fractured leg case was removed to a grog-shop well attended—is somewhat deranged and in a very critical state—I thought that this might be the means of bringing some to reflect on their evil ways—while there is hope.

One month later the surgeon reports: "We took from his thigh a piece of bone the other day two inches long and something more than half the bulk of the middle of the femur—discharge profuse, hectic."

A family have a new son. "He has unfortunately one club foot. I have been engaged this morning dressing it and for want of better apparatus I have wrapped it in strips of old linen wet in glue and holding it in its place a long time until it became dry, I found likely to answer a good purpose." Nine months later his follow-up states, "I did not effect a cure."

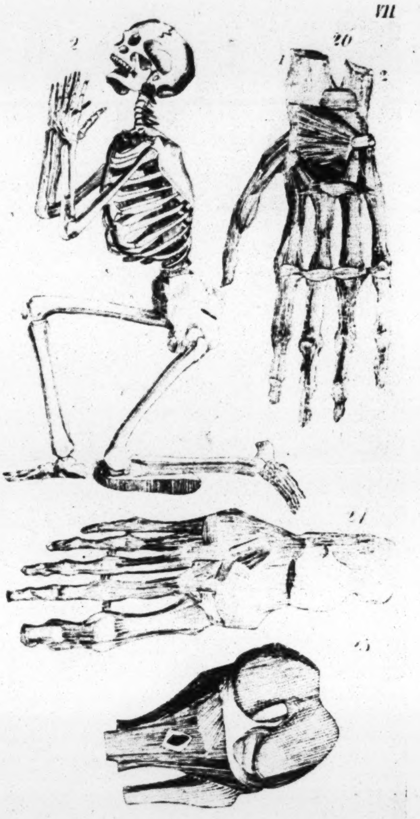


FIG. 4. LIST OF ENGRAVINGS IN DR. JUDD'S ANATOMY. DONE ON COPPER PLATE BY HAND IN 1837. ATTENTION IS CALLED TO THE SKELETON'S "ATTITUDE OF PRAYER."

Maternity cases were among the troubles of the time. He describes one case where the mother was attacked with fever, accompanied with a severe headache, unable to bear the least light or sound. "I shaved her head and applied a large blister and she was raised again to health after a fortnight's confinement." He says that "Mrs. E's little one has a tumor on its head which endangers its life. The disease is what is technically called Spina Bifida."

One of his trying obstetrical cases was that of Mrs. "R." Everything had been done to save her life that could be done. When it was found that a natural delivery could not be expected the forceps were resorted to: This was on Tuesday night, but the parts were too rigid to admit anything to remove the child. They were resorted to again in the course of twenty-four hours but in vain. The patient sank under her suffering and lay for several hours in a lethargic state. It was proposed that she be delivered by the introduction of the crotchet. Her consent was not readily obtained but after rest by means of an opiate and her pains induced again by the power of ergot, she consented to the operation and a child was extracted: She was so much exhausted that it was thought best to let her rest before anything was done to remove the placenta. The child was removed on Wednesday night and some hopes were inspired that she would survive. She remained in such a state of weakness and wandering of mind that the physicians concluded that it would not be well to take any measures further to extract what remained in the womb, but to wait and see if nature would not make further efforts and so give relief. They waited till last evening. As she had gained some refreshment and was in a rational state of mind Dr. Judd told her that there was no hope of her life unless she would consent to an operation. She consented and being placed in a proper position was further examined, when it was found that another child remained. It was taken away together with the placenta. She sustained the whole operation which occupied about two hours, much better than she feared. She complained of pain in the uterine region. She refused medicine but the doctor succeeded in getting her to take some laudanum. Her slumbers after this were accompanied with loud snoring and rattling in her throat. "At 12 o'clock her happy spirit took its flight to join the departed ones whose mortal existence had been the price of her own."

In his services to the Mission, he provided all medical books for the many stations, most of which were without doctors! Dr. Judd was one of the founders of Oahu College and, with his wife, was a leader in all educational movements. He contributed practically all the anatomical names in the Hawaiian language. In addition he started a "Book of Treatment" written in Hawaiian copy, giving the symptoms, diagnosis and treatment of various diseases. His textbook of Anatomy consisted of 60 pages and was printed and bound at Lahainaluna, a Mission School on Maui. These Missionaries realized that their teaching could not be done in English. They must learn Hawaiian themselves. They were therefore forced to reduce an unwritten language to a written one—an endless task. Copper engraving was done with the simplest of tools on stray copper pieces obtained from shipmasters. Dr. Judd's Anatomy contains 19 engravings all of which are excellent anatomical reproductions.

His Judd Trail on the Island of Hawaii still remains in part and is accepted by surveyors as a product of difficult labors.

While on Hawaii in 1841, he aided a geological survey and almost lost his life in the active volcano of Kilauea. The extract from his letter says:

> I went down into Kilauea to collect gases taking a frying pan to dip up some liquid lava. We descended the black ledge,

placed the tube for gases and as we passed a small crater quite cool apparently, I stopped to gather some "Pele's Hair." Suddenly I heard the report of an explosion, a fiery jet burst up from the center and a river of fire rolled toward me. The heat was intense, I could not face the fire so I turned to the wall but could not climb over the projecting ledge. I prayed God for deliverance and shouted. Kalama, a guide, heard me and came to the brink but the intense heat drove him back. "Do not forsake me and let me perish," I said. He came again and seized my hand with both of his and I threw myself out. The fire swept under as I went over the ledge, burning my shirt sleeves and wrist and blistering Kalama's face. The crater filled up in a few minutes and with the frying pan lashed to a long pole I procured some lava and ran away with all speed as it began to over flow.

DIPLOMATIC SERVICES

Leaving the Mission as its physician, Dr. Judd became the guiding star of the new Hawaiian Monarchial Government. His diplomatic attainments are, indeed, commendable.

Dr. Judd delivered Kinau of a son, Alexander Liholiho, February 9, 1834, the child who later became Kamehameha IV. Kinau and her son came under the influence of the Judd household and this association undoubtedly led to many of the physician's contacts with the Royal family.

In passing it is worthy of note that Kamehameha IV married Emma Rooke (daughter of Dr. Rooke) and ascended the throne at the age of twenty years. It was she who personally solicited the funds and built The Queen's Hospital, an enduring monument to her memory. The young king died of grief at the age of twenty-nine over the loss of his only son.

Dr. Judd attended Kaahumanu, the widow of Kamehameha I (the first of royalty to accept Christianity), during her lifetime and was present at her death.

Kamehameha III or Kauikeaouli, a brother of Kinau, appreciated the value of Dr. Judd's worth in the formation of a strong government and in 1841 the doctor became a translator and recorder of the Government.

In 1843, an English man-of-war came to Honolulu and sought cession of the Islands because of alleged injuries done to Englishmen.

Kamehameha III ceded his whole kingdom of Islands to Lord Paulet until he could hear from England. He then withdrew to Lahaina, Maui, and left his government in the hands of Dr. Judd. Preparations were being made to send an envoy to the British government. In such a crisis it was most important for Kahemahema to be represented. In the silence of midnight in the royal tomb, Dr. Judd used the coffin of Kaahumanu for a table to prepare dispatches. He had notified the King by sending an open canoe with a picked crew across the open sea of sixty miles that certain papers required the King's signature. The documents were signed and intrusted to an American who traveled on the same vessel with Lord Paulet's messenger. It was a race for a country.

After five months of the seizure, Admiral Thomas entered the harbor. On the day of restoration he ordered the British flag to be lowered and in its place a new Hawaiian flag rose and caught the breeze.

In 1845, the doctor became Secretary of the Interior as well as Secretary to the Treasury.

During a birthday party for the King, a salute from the fort on Punchbowl was fired. There was a "premature discharge of a gun and the

King was much affected and turning to Dr. Judd said, 'Make haste.'" A horse was mounted and the hill ascended in front at its steepest angle, a feat seldom performed. One native was killed and two others badly injured. We see that even in the days before telephones, a doctor's social life was often interrupted.

As Minister of Finance in 1849, Dr. Judd was sent to the United States, England and France with Kamehameha III's sons. In case certain treaties were not negotiated, this diplomat was to dispose of the crown, which had become one of thorns, to the highest bidder.

The extremity in which the King felt himself to be at the time of the departure of Dr. Judd on his mission to France is disclosed by the secret instructions which were confided to the commissioner. They were as follows:

> Kamehameha III, By the Grace of God, of the Hawaiian Islands, King,
>
> To our trusty and well beloved subject Gerrit Parmelee Judd:
>
> In case our Independence be not fully recognized, or endangered by the acts of any other Government, or our Sovereignty in peril or rendered of no value, our Royal Domain being exposed to further hostile attacks without just or good reasons, or from any other cause, you may find these instructions necessary. These are to command and empower you, on our behalf, to treat and negotiate with any King, President or Government or Agent thereof for the purpose of placing our Islands under foreign protection and rule.
>
> And you are hereby further commanded and empowered to treat and negotiate for the sale of and to sell all our Private Lands, and those of our Chiefs, subject to our ratification and the free concurrence of our Chiefs.
>
> Done at the Palace, Honolulu, Oahu, Hawaiian Islands, this seventh day of September, A.D., 1849.

The instructions were signed by the King and the premier, and countersigned by the minister of foreign relations. The authority so entrusted to Dr. Judd he found unnecessary to exercise in view of the friendly attitude which he perceived to exist on the parts of Great Britain and the United States.

Early in the summer of 1853 that terrible pestilence, the smallpox, made its appearance; how or whence introduced is still a mystery. It is supposed that the infection was brought in some trunks of old clothes sold at auction and scattered among the natives. The first victims were two women, who washed some of these articles.

Great efforts had been made in former years to vaccinate the people very extensively, and thus avert a calamity so much to be dreaded. Medical men and missionaries had taken great pains to procure vaccine virus. When obtained, the very best depreciated rapidly, affording protection to a few hundreds only before losing all its virtue.

A little patch of yellow calico, waving on a pole, indicated pestilence and suffering within. The Board of Health and undertakers were busy men. Physicians and the visiting committee bowed down and became at times utterly prostrate in their untiring efforts by night and by day to dispense medicine, food and comfort. The Pale Horse and his rider rode on, counting the vanquished by thousands, in spite of human effort, till the destroying angel had finished his work. Over 15,000 natives perished!

Indignation meetings were held, and inflammatory speeches addressed to the rabble. A committee of thirteen was chosen to revolutionize the Government, and reconstruct it to suit themselves. The first act was to fix upon a victim on whom to charge the calamity. The lot fell upon the Rev. R. Armstrong and Dr. G. P. Judd, two men who perhaps had done more than any other to avoid it. They were accused of introducing the scourge, for the purpose of destroying the people. They were stigmatized as traitors and wholesale murderers of the deepest dye, and no pains were spared to rouse the natives, and exasperate them to deeds of revenge. Petitions were addressed to the King to remove them from office under vague and unfounded charges. Wearied with turmoil and overcome with strong drink, the King sent a messenger for Dr. Judd one evening and demanded his resignation. Dr. Judd resigned. He remarked one day to a friend that he thought few generals ever came off from so long a campaign with fewer scars or less injury to their uniforms.

In 1854 Dr. Judd retired to private practice and his influence continued to grow within the community. He established a chemist shop in conjunction with his medical office.

His home life with his family of nine children was one of great joy. In 1872 his charming wife, she who had braved the sorrows and troubles of almost sixty years in a Heathen land, passed to the "Great Beyond." On July 12, 1873 Dr. Judd died following a paralytic stroke.

Surely Gerrit Parmalee Judd was a surgeon and diplomat, a Christian and a public benefactor.

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STEPHEN ELLIOTT

By JOHN HAMPTON HOCH

CHARLESTON, S. C.

STEPHEN ELLIOTT, one of the earliest and warmest advocates for the establishment of the Medical College at Charleston, was born at Beaufort, S. C. on November 11, 1771.

Now that we have, in the prescribed fashion, ushered the leading character onto life's stage let us go back and glance at the prologue.

Thomas Elliott, a sturdy Quaker pioneer from Cornwall, England, settled in Berkely County, S. C. toward the close of the seventeenth century. Among his nine children, the fruit of his union with Mary Gibbes and Hebzibeth, was a son William, the grandfather of the subject of this sketch. William during his twenty-seven years of life among other things took to wife Elizabeth Emms. Of the four children of this marriage, William Jr. was the only one to transmit the Elliott name. From the St. Helena Parish Register we learn that William Elliott, Esq. of Beaufort married three times, the second wife, Mary Barnwell, being the mother of his sons William, Ralph and Stephen.

Which brings us to the point where the curtain rises.

Only twelve years of age when his father died, Stephen's education was attended to by his brother William who was ten years his senior. The rudiments were obtained from several Beaufort teachers, the last of whom was Rev. Abeil Holmes. The essentially religious nature of Stephen Elliott probably owed much to this New England divine. Rev. Mr. Holmes sent his pupil to Mr. Baldwin of New Haven, Conn. for further tuition during a couple of months in the winter of 1787–8. On February 16, 1788 Elliott entered Yale College, he then being but sixteen years old, and graduated three years later. Even at this early time natural philosophy was much in his thoughts if we can judge by the title of his baccalaureate oration, "The Supposed Degeneracy of Animated Nature." This novel subject had but recently been suggested by Buffon and Raynal. In later years his alma mater, in recognition of Stephen Elliott's considerable accomplishments both in literature and science, bestowed upon him an honorary degree, at the same time that a similar honor was paid his friend and fellow townsman, Joel R. Poinsett.

A change of scene, now. The earnest scholar returns to his home and we are told "applied himself to agricultural pursuits; and part of his paternal estate lying in Georgia, was induced to pass his winters in that State, and his summers in Beaufort."

A large part of the inducement we are inclined to believe was the person of Esther Wylly Habersham. This young lady who, in 1796, became Mrs. Elliott, was the daughter of Dr. James Habersham of the noted Georgia family, and this connection may have had some influence in directing Elliott's thoughts toward politics and toward medicine.

In 1794 he had begun his legislative duties as a representative from St. Helena Parish, serving first in the lower house and then in the upper. He declined to run in 1800, suffering the fate of the Federal Party, although he did later succeed his brother in the Senate from 1808–12. This last period is said to have been marked with more than ordinary abilities; his name appears on almost every page of the journals in committee assignments and as the author of bills, the Free School Bill (1811) and the Bank Bill (1812) being the two outstanding results of this activity. His efforts on behalf of the first bill led to his designation as the "father of the first public school system of South Carolina." When the latter bill became law and the Bank of the State was established at Charleston, Stephen Elliott was elected president, a position he continued to hold during the remainder of his life. That he was an able executive and that he thoroughly vindicated his judgment as to the feasibility of a state-owned bank for South Carolina is indicated by the assertion that "the State Bank of S. C., owned entirely by the State, was one of the few that made a satisfactory showing during this period."

This appointment led to a change of residence, and from this time Charleston became his home. The boundless energy, the sparkling versatility of this accomplished scholar and naturalist continued to spread out into ever larger and larger spheres of activity. The year 1813 saw the formation of the Antiquarian Society, the name of which was in the following year changed to the Literary and Philosophical Society of South Carolina, and Stephen Elliott as moving spirit in the formation of this Society was, throughout his life, its president. In the first anniversary address he outlined the subjects embraced by the Society and discussed the fields of research presented. This address reveals the capacious mind and the finished style of its author to a remarkable degree. In the section dealing with Anatomy, Surgery, Physiology, and Medicine he laments that "the principle of life is still unknown" and that it is "difficult to give medicine a system," also stating that

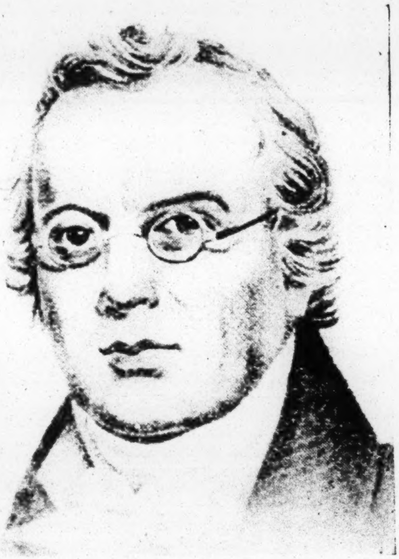

FIG. 1. STEPHEN ELLIOTT. THIS IS A COPY OF THE ONLY KNOWN PORTRAIT, A SMALL ENGRAVING MADE IN PHILADELPHIA TO DECORATE THE NOTES OF THE SOUTH CAROLINA BANK OF SAVANNAH. A BUST OF STEPHEN ELLIOTT IN THE CHARLESTON MUSEUM WAS RUINED BY THE EARTHQUAKE OF 1886.

> . . . of the diseases which two thousand years ago, proved the scourges of our race, how few have been subdued; and of the countless generations of man, how few are there, even excluding those that perish by violence or accident, who die from the natural decay of the organs of life, who, having performed all their functions, and fulfilled all their duties, fall like autumnal leaves in the fulness of days and of maturity.

Science has been defined as classified knowledge, and if we accept the implied *sine qua non*, we must label Stephen Elliott a thorough-going scientist. The orderly process of mind as revealed in his writings and as manifested in his works is remarkable. This mental attitude plus his official relation to the Charleston Library Society—he was elected president in 1816—gave rise to the publication of his Scientific Catalogue, said to have been one of the best scientific and alphabetic catalogue of books that had ever been published by any similar institution.

In 1815 the Literary and Philosophical Society received from the Charleston Library Society its scientific collections which became the nucleus of the Charleston Museum. The Museum was further indebted to Elliott for personal collections and for advice and assistance in the arrangement of specimens.

Stephen Elliott was the author, also, of the memorial to Congress in reference to the tariff, which recalls the fact that he lived in those stirring days when Calhoun's passionate sectionalism had South Carolinians engrossed, and many bristling and defiant on the subject of states' rights and the tariff.

The remarkable energy and many-sided activities of this man make it most difficult to present a composite picture of his accomplishments. As yet we have said nothing of his botanical work, and it was this field of endeavor that was destined to give his name most decided and extensive celebrity.

In the years between 1800 and 1808, while absent from the Legislature, Elliott devoted his attention to the study of botany. He traveled about collecting, examining, and preparing a large part of the materials which later were to form part of his elaborate and valuable work, "A Sketch of the Botany of South Carolina and Georgia." During the years following 1808, when in the midst of legislative, financial, and scientific engagements, he found leisure hours to devote to this study, supplementing the nucleus formed in the earlier years. In earnest of his devotion to his beloved botany he delivered, gratuitously, a course of lectures to a large class, this undertaking being sponsored by the Literary and Philosophical Society.

At the time, the botanical studies of this section of our country were somewhat meagre and not only expensive but often unattainable. This inconvenience was particularly complained of and regretted by many of the members of the Botany Class who had begun to experience in an increased degree, the excitement which, for a while, its formation awakened. Here, then, we have a motive for the publication of Elliott's work, which supplied the want of an up-to-date survey to aid in the study of the local flora particularly.

As early as 1816 he started publishing sections, but the first volume was not completed until 1821 when it was published with a dedication to the late Rev. Henry Muhlenberg of Lancaster, Pa. In 1824 the second volume appeared with an inscription to Dr. James Macbride (1784–1817). The work, begun under many embarrassments, was completed under a sense of obligation to those who encouraged and assisted him in it. As he himself says, "The individuals who took most interest in the completion of this sketch scarcely lived to see the commencement of its publication." The "Sketch," now recognized as a classic among works relating to North American botany, added over 180 genera and more than 1000 species to the "Flora Caroliniana" of Thomas Walter the last work on Southern flora prior to Elliott's.

Stephen Elliott's herbarium is preserved in the Charleston Museum, unmounted and tied up in twenty-eight large volumes. It contains beside his own collections in this region, many specimens from Schweinitz, Rafinesque, Torrey, Oakes, and Muhlenberg. Drs. Baldwin and Macbride and Mr. Gourdin were colleagues of Elliott, Macbride particularly assisted him materially in the work and enriched it by many observations upon the medical properties of the plants.

In the words of a contemporary fellow-citizen, a laborer in the same field of endeavor, Dr. J. L. E. W. Shecut:

> As a direct and truly scientific classification and arrangement, containing new and hitherto unknown or nondescript species, together with a mass of valuable information with regard to the agricultural advantage and medicinal properties of many species, this work may be justly considered the best on the botany of these states that has yet been offered to the public.

Elliott continued his botanical studies up to the time of his death. Among several undertakings begun, not ended, was a Prodromus, founded on the natural system of Jussieu, which he intended to annex to his "Sketch."

Although devoted to the study of botany it was not the only subject of natural science that held his interest. He gave considerable time to the study of conchology and entomology and classified a noteworthy collection of shells. An unfinished work of his on shells remains in manuscript.

Elliott's fame rests chiefly on the work which he so modestly termed a "Sketch," a work of over 1300 pages written in Latin and English and containing a dozen finely executed plates. This enduring monument to his scientific skill was, for many years, the only authority for the plants of the region it embraced, and it remains today an invaluable aid to the taxonomist. The patient labor involved in the preparation of this work, where almost every line contains a statement of fact learned from original observation, is difficult to fully appreciate. A large part of its value lies in the fact that Elliott's observations on the structural characteristics and properties of the plants were obtained by studying them as he found them growing in their natural habitats and not exclusively or principally by an examination of dried and unsatisfactory specimens preserved in herbaria.

In 1822 when the Medical Society of South Carolina petitioned the Legislature for authorization to establish the Medical College at Charleston, Stephen Elliott carried the memorial before that body. Although the patronage sought was withheld we can be sure that his influence materially aided the objective of the Society. When the college was a reality and the faculty was organized, the chair of Natural History and Botany was quite naturally offered to Stephen Elliott who was elected to that post in April, 1824. After serving for a year (1825–6) he was given an honorary diploma at the first commencement. The address he delivered November 13, 1826 at the opening of the next session was published at the request of the Faculty and City Council. The inauguration of the new college building led him to predict a new era of medical achievement for South Carolina and in the address he eloquently expressed educational precepts which are as valid today as they were then.

Prior to this connection with the Medical College, the trustees of South Carolina College had, upon the death of Dr. Maxcy (1820), offered Stephen

Elliott the presidency of that institution. This honor he refused because of the adverse criticism directed at his leaving the bank, whose creator he had been, for at that time the bank was in a precarious condition. Rather than have it appear that he was deserting a sinking ship, he relinquished the desire of his heart and splendidly applied his abilities to the business that seemed to need his services.

To Stephen Elliott is due praise for having established the *Southern Review*, a quarterly copied after the English reviews of the day. A mirror which caught the scattered rays of knowledge from all parts of the South, this journal marked an epoch in the scientific and literary history of South Carolina, awakening genius, exciting curiosity and stimulating endeavors. Elliott and H. S. Legare were associated as editors from 1828 to the time of Elliott's death, two years later. During this short space of time Elliott contributed numerous articles covering a wide variety of subjects. His article on "Classification of Plants" was an historical summary of taxonomic botany and showed his familiarity with the work of foreign botanists.

On March 28, 1830 the curtain descended. Under the strain of such strenuous mental and physical demands, too great for him to sustain, Stephen Elliott was struck down by apoplexy. When his body was laid away in St. Paul's churchyard Charleston's civil and educational functions were suspended while the bells tolled his passing.

Epilogue

How Elliott was able to undertake so much and to do what he did undertake so well is, to put it mildly, surprising. Dr. Moultrie in his "Eulogium on Stephen Elliott" says:

> His genius was comprehensive and embraced a wide extent of knowledge—profound, and went to the bottom and first principle of things—minute, and examined them with particularity, accuracy and circumspection—methodical, and understood their relations—practical, and applied them to proper uses.

A man of varied talent and extensive information he was withal mild and unassuming in character and deportment.

If not in truth the Admirable Crichton of South Carolina, Stephen Elliott was certainly one of her finest intellects.

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EDWARD PURCELL

THE FIRST PHYSICIAN IN MINNESOTA

By JOHN M. ARMSTRONG, M.D.

ST. PAUL, MINN.

IN the year 1819 the Fifth United States Infantry was stationed at Fort Gratiot, near Detroit, under command of Col. Henry Leavenworth. On the tenth of February of that year an order was issued that the Regiment proceed to the upper Mississippi, and on April 13th a supplementary order directed that the command proceed to Fort Howard, thence by way of Green Bay, the Fox and Wisconsin rivers to Prairie du Chien. When the expedition left is not known, but it arrived at Prairie du Chien on June 30. The object of our government in sending troops into this northwest country is stated in a letter written by Surgeon Edward Purcell, a major in the Medical Department of the army, and at that time with the Fifth Infantry. The letter is as follows:

Detroit, March 20, 1819

Dear Brother,

I now write and most probably for the last time from this place. Not many days since I received information from the Surgeon General that the requisition I had made out for the Regiment for the current year had been received and that medical supplies would be directed to my care on the Mississipia, probably the Falls of St. Anthony.

A few days after I received this letter Major General Macomb, commanding the Department of the Army, arrived from Washington City and brought the orders that our Regiment should march for the mouth of the River St. Peters, which emptys into the Mississipia, as soon as navigation is open, which will be by the first of May. The St. Peters is in North Latitude about the 45th, three degrees further North than this post. It is in that part of the country inhabited by the Indians called the Soux (pronounced "Soos"). They are a warlike and powerful tribe, but as our Indian affairs now stand, we have nothing to fear from them. The intention of our Government appears to Garrison the whole of our North and North West frontier; this with the view of cutting off British influence amongst the Indian tribes and protecting our frontier settlements, a very laudable intention. Our Regiment Garrisons, three Posts, one to be at the mouth of the St. Peters, which will be headquarters, and where I shall be stationed, one at the Prairie Du Chien (or dog meadow) and one at Fort Armstrong, about two hundred and fifty miles below the last mentioned place. As the Regiment is composed of 10 companies, we shall have 8 at Head Quarters and one at each of the other Posts. This will give us a very good society as we shall have at least 20 officers at our Post and many have wives. You may think it strange that I have consented to go with the Regiment out of the world, as you may call it, but the fact is I go, not because I like it, but because I think I can make money. I shall at least make as much as will pay for my lands in the course of three or 4 years and this will be doing much. During that period of time you need not expect to see me, and as for communications by letter, I will in my next inform you how to direct, in the mean time I wish you to write me as soon as you receive this and direct it to this place.

It is thought that we shall not get more than two thirds of our way this summer, and that we shall be obliged to remain 400 miles on the Mississipia below our intended post this winter. We go by way of Mackinaw and Green Bay, pass up from Green Bay, the Fox River, then cross over to the Ouisconsing, descend this river until we arrive at the Mississipia, this river will bring us out at the meadow of dogs, where no doubt we shall winter, and the next spring ascend the 400 miles until we arrive at our destined post.

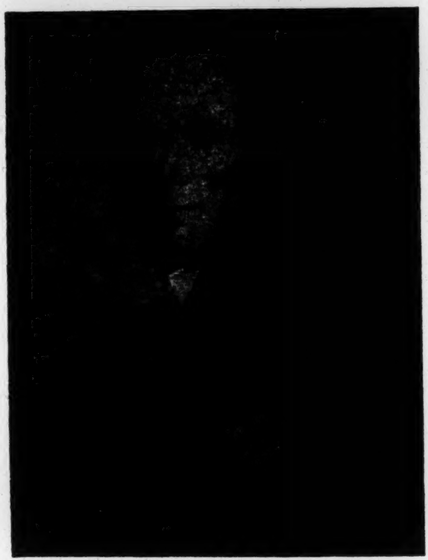

FIG. 1. SURGEON EDWARD PURCELL, U.S.A., THE FIRST PHYSICIAN TO PRACTICE IN MINNESOTA. COURTESY OF MISS MARY CALDWELL PURCELL.

We shall be obliged to build our barracks etc. etc., also a saw and grist mill. No doubt we shall live as much like farmers as Soldiers. I leave my lands in charge of an agent at this place by name, Henry J. Hunt, whose father has been a Colonel in our army & himself now a respectable Merchant & Citizen in Detroit. He will not only have charge of the lands that I own in this Territory but of a town lot in Parysburgh on the Miami of Lake Erie containing two acres, one town lot in the County town on Monroe on the River Raisin in the Michigan Territory, for which has been paid in full 100 dollars, also the deeds and patents of two quarter sections of land in the Illinois Territory, each containing 160 Acres, both amounting to 320 acres, together with some horses, Cows, Furniture, etc. etc. I mention this that in case any accident should happen to me, you may know where to apply to obtain my papers. I have also on an Island called "Hersens" at the mouth of the River St. Clair, near to where I purchased my lands, four horses and on the main a few miles up the River one mare, at my house that is within two miles of Fort Gratiot, I have one or two cows, some pigs, house-hold furniture and axes, saws, etc., etc. etc. These are in charge of a tenant whose name is Ebenezer Shaw. It is my intention to remain in the Army five years longer, when I shall resign and go into private life, during this space of time we shall no doubt remain at the same post on the Mississipia. It was my intention did I remain at this place to visit you next summer but as affairs now stand, its utterly impossible. I have heard nothing of Lipton. Present my love to Father, Sisters Margaret & Anne.

Edward Purcell

As previously stated, the command reached Prairie du Chien on June 30. The journey to Green Bay was probably made by steamboat and the rest of the journey to the Mississippi by hand-propelled boats. At Prairie du Chien the expedition waited for Major Thomas Forsyth to arrive from St. Louis. On August 8 the troops, consisting of ninety-eight rank and file, embarked in fourteen batteaux and two large boats. In addition to these there were Major Forsyth's boat and the Colonel's barge. Twenty boatmen also accompanied the party. How many persons the barge and boat contained is not stated. On August 23 the Colonel and some of the boats reached the present site of Mendota at the mouth of the St. Peters river, as the Minnesota was then called, the majority of the flotilla arriving the next day.

It seems remarkable that this journey was made in fifteen days. The boats were what were known as Keel boats. When the nature of the river bank permitted, they were dragged by ropes and when not they were propelled by poles. In September one hundred and twenty recruits and officers arrived from Boston; so that in the winter of 1819–20 the personnel of the post could not have much exceeded two hundred and fifty. The troops immediately on their arrival began to erect log cantonments at the present site of Mendota, where the first winter was spent. The following spring the encampment was moved to the Springs on the left bank of the Mississippi, a short distance above the present bridge. In 1821 the log fort near the present site was occupied but not completed. The post was called Fort St. Anthony till 1825 when it was named Fort Snelling after Col. Josiah Snelling who succeeded Leavenworth in command in 1820.

After this perhaps unnecessarily prolix introduction let us take up the subject of this paper, Edward Purcell, the first physician to practice medicine within our present Minnesota, though this part of the country at that time was part of Michigan Territory. Of Purcell's early life we are ignorant. It is known, however, that one Edward Purcell came to America from Ireland with his five children and settled in Virginia. This Edward Purcell was the father of our doctor. The mother, née Frances Lipton, had died on shipboard and was buried at sea. The year of the immigration is unknown but the first Federal census of 1790 gives him as the head of a family of five living in Hampshire County, Virginia, so Doctor Purcell must have been born previous to that date. The family later moved to Pennsylvania where Edward Purcell the elder died May 8, 1836, in his seventy-fifth year. The name on his tombstone was spelled Percall and was accented on the last syllable.

As Doctor Purcell was the third of the five children and all were born in Ireland, we possibly are at liberty to place the date of his birth previous to 1785 and as he was married in 1808 that would make him at least twenty-three years of age at that time and twenty-eight when he entered the service of the United States as Surgeon's Mate on May 2, 1813. On April 18, 1818 he was promoted to Post Surgeon and on July 21, 1818 Major and Surgeon of the 5th Infantry. The accompanying portrait of Edward Purcell shows him in the uniform of a Major. It could not then have been painted previous to 1818. In 1819 he came to Minnesota and there was no one at Fort Anthony, during his residence there capable of painting such a portrait, furthermore it is stated that his effects after his death in 1825 at Fort Snelling never reached his family. However, he was on leave of absence for a period in 1824 so that it is possible that the portrait may have been painted at that time. Assuming that the portrait shows him as a man thirty-five to forty years of age, that again places the date of his birth about 1785. As this portrait is now in possession of his descendants it is obvious that he did not have it with him at Fort St. Anthony nor was his family with him at that post, nor apparently were they with him at

Fort Gratiot, as one may infer from no mention being made of them in his letter to his brother quoted in the beginning of this sketch. His wife was an Elizabeth Shirk. Three children were born of this union, the youngest a son named John, born in 1812, was grandfather of Miss Mary C. Purcell of Manhattan, Kansas, to whom the writer is indebted for the genealogical material, the two letters and a copy of the portrait. Of Doctor Purcell's medical education nothing is known. Examinations of medical men entering the Army were established early in the Revolutionary War, but were allowed to lapse thereafter so there is no record of his qualifications. The regulations of the Medical Department for 1814 provided for examination of candidates not graduates "from a respectable medical school or college" but that was after Purcell entered the service. His military record as furnished by the Surgeon General and Adjutant General's offices contain no information regarding him other than that already given except that he was appointed from Virginia and was at Fort Mifflin in 1814, that he was ordered to Fort Gratiot on May 18, 1817 and was retained as Major and Surgeon June 1, 1821, there having been another reorganization of the Army at that time. The reason perhaps that but little is known about Purcell by these offices is because the records of Fort Snelling to 1857, when the post was temporarily abandoned, never reached Washington. My inference is that they were then sent to St. Louis, remained there and were destroyed during the disturbance incident to the Civil War. Despite this lack of information much may be gained from other sources. In 1816 James Mann published at Dedham, Massachusetts, "Medical Sketches of the Campaigns of 1812–13–14." This book is one of the first American books on military medicine and is credited with influencing many reforms regarding the Medical Department of the Army made in 1818. The book contains two articles by Surgeon's Mate Purcell, one a description of the illnesses affecting the men under his care at the time the sick were evacuated from Plattsburg to Burlington, Vermont, on September 5, 1814, and the other, shorter than the first, narrates three case histories of soldiers suffering from a disease of the mouth. Probably we would now diagnose the illness of these men as Vincent's angina. He describes his treatment as futile till he prescribed Fowler's solution, which proved efficacious. As regards the sick removed from Plattsburg, they were about 815 in number, fifty of them wounded. They were transferred to Crab Island, but as no adequate provision had been made there for them, Dr. Purcell on his own initiative succeeded in removing them to the hospital at Burlington in open boats, across the lake, a distance of twenty-five miles. From this time till he was at Fort Gratiot we have no information regarding his station.

Of his activities at Fort Snelling government records are also lacking. Our Minnesota histories all record the fact that the garrison there during the first winter suffered severely from scurvy, a common complaint in isolated army posts at that time. The disease was also prevalent during the second winter. As regards this Prescott's[1] and Mrs. Adams'[2] statements must be accepted as the most authentic as Prescott was there in the early spring of 1820 and Mrs. Adams was at Fort Snelling in 1823. Sibley's[3] statement is hearsay evidence and Mrs. Van Clive[4] was less than a year of age at that time. Folwell,[5] who apparently examined all sources of information states:

> The cause of this sudden and violent outbreak of disease was attributed to the villainy of certain contractors or their agents, who drew the brine from the barrels of pork to lighten the loads on leaving St. Louis and refilled them with river water before delivery at Fort Snelling.

In a footnote to the above he says, "The number of fatalities is variously given. Mrs. Van Clive estimates that forty succumbed, Sibley that nearly one half the command perished." Prescott says that "some fifty or sixty had died and some ten men died after I arrived." Mrs. Van Clive tells of the relief obtained by the use of "spignot root," doubtless spikenard, then and now abounding in the region. Prescott attributes the abatement of the malady to "the groceries which he brought and a quantity of spruce that Doctor Purcell had sent to the St. Croix for." It would seem to me that spikenard root would be difficult to find in the winter with snow on the ground and that the other account is nearer the truth. Mrs. Adams also says the flour and cornmeal issued the soldiers had been ruined by dampness and many of the men refused to eat it. Let us now turn to the report of the Surgeon General[6] for the year 1820 which no Minnesota writer appears to have consulted:

> At St. Peters the prevailing disease was scorbutus . . . It appears from the official reports, that the troops at St. Peters . . . were exposed to many of the causes both predisposing and exciting of scurvy. During their progress . . . from Green Bay up the Mississippi they were not infrequently obliged to labor in the water beneath the rays of an ardent sun, sleeping in their wet clothes and exposed to a damp atmosphere impregnated with malaria, they became reduced by disease; and in this state of predisposition to scurvy they began, late in the season the establishment of their winter quarters . . . at St. Peters . . . they were destitute of groceries and vegetable food, except flour and corn which were more or less damaged from having been wet; and their animal food, which was principally salted, they were obliged to eat during a portion of the winter in a putrescent state. This condition of the meats, however, was as far as practicable corrected by washing and boiling in charcoal.

The report also states that in the last quarter of 1819 there were but forty-two deaths, from all causes, in the Northern Division, one-half of which were at St. Peters. The report then goes on to say:

> The number of men reported at Camp Missouri on the first of January 1820 was 788 and at St. Peters 228, making an aggregate of 1016. The total of cases (of all illnesses) for the first quarter at these two points was 895; of these 503 were of a scorbutic character and the number of deaths from this cause was 168.

As this is a joint report on the troops at Fort Snelling and Council Bluffs one cannot assign any definite number of deaths to either post. I may add that the rations furnished the troops at Council Bluffs were as bad as those at Fort Snelling. There was another cause for the scurvy, however, not mentioned by the Surgeon General, and that was the liquor ration, then regularly issued to each soldier. Mrs. Adams says, "Whisky rations were issued to the troops regularly, however, and sometimes it seemed that about all they had was whisky." At a slightly later date we find in some of the official correspondence between the commissary officer at Fort Snelling and the Commissary General at Washington a suggestion by the latter that an additional allowance of 1500 gallons of whisky be added to the former's requisition for supplies "in order to keep the soldiers contented." I may say that the Medical Department of the Army had been actively opposing the whisky ration for some years before this time, having noted its deleterious effect, particularly during the war of 1812. In 1830 a vegetable ration was substituted for whisky.

From 1822 to 1826 the health of the garrison at the fort was good. There were but two deaths between September 1822 and September 1823, six in 1824 and seven in 1825. What was the life at Fort Snelling in these early days? In the summer hunting was the principal amusement and furnished diversion for both officers and men. In the winter or from the time the river froze till the ice ran out in the spring there was no communication with the outside world and often no mail. All were closely confined of necessity to the barracks and life must have been monotonous in the extreme. Intemperance, a fault of the time, both among the officers and men, was almost universal and produced deplorable effects, quarrels and even duels between the officers. White feminine society was practically lacking. But four women were at the post the first winter and not many more later. But Indian women were plenty and complacent. Practically all the unmarried officers had mistresses among the wigwams and some of the few married officers were not exempt from this diversion. Some acknowledged them as wives, but the greater number did not. Many had half-breed children.

In 1824 Purcell was away on leave and the following letter is preserved, written to him by his Hospital Steward. Evidently things were not going well at the hospital. It depicts, between the lines, social conditions at the post.

June 5, 1824.

Dear Doctor:

In consequence of what has happened between yourself and me I venture to address you familiarly, although contrary to military ettiquette. Since your departure from this post, no exertions on my part have been wanting to arrange your business in proper order. I found many articles of your property in different places, which I have collected and taken care of. I have taken from your room, two trunks, one of which I delivered to Mr. Gibson, and the other to Mr. McKenzie, also some letters for Mr. Gibson. It is with a deference to him, that I would speak of Mr. Gibson, his manner of managing affairs is in my humble opinion calculated to do no great honor to myself or service to his employer. I need not mention some of his habits to which he is addicted as you are well acquainted with his general conduct for some time past and I will only say there is no reformation. He places no confidence in those who are under his direction; wishes to manage every minute particular concerning the hospital himself, yet he appears entirely ignorant of the manner of doing it and his domineering position is not calculated to gain him much information. I shall obey his orders promptly so far as I am bound to do it, unless they are prejudicial to your welfare, in which case I shall feel a pleasure in protecting property for which you are responsible, and promoting your interest at all hazzards. Were it not for the numerous obligations which bind me to your interest and the anticipation of your return to this post, I would immediately resign the situation in which it appears I am not considered by Mr. G. worthy of that consideration which you have reposed in me, and in which I venture to say you have never been deceived. Amenable to the Colonel's orders of the first and third instances, I can do no more, no less than duties assigned to a hospital steward by the regulations, which does not exactly agree with your private instructions to me. I have said nothing to the Colonel upon the subject, considering it was my duty to obey and not my business to inquire into the Commanding officer's reasons for issuing his orders. I have been explicit in stating circumstances which I would wish may be in confidence for your own particular information, and that if on your return you did not find me at the hospital you may not be disappointed.

I have omitted many circumstances relative to Mr. G.'s conduct which affect my own feelings and I shall endeavor to bury them in oblivion. Since your departure from this post, there has been a vacancy in my mind which no substitute can fill which you will no doubt perceive from the tenor of my letter. My spirits are dejected and my health rather declining in consequence of the contemplated situation which I am placed. The affairs of the hospital I have managed in the usual way as far as I have been permitted. It is a general time of health at the post. If it is consistent with your views please favor me with an answer to this letter. Be pleased to accept my affectionate esteem and best wishes for your welfare.

I am, Sir,
Very respectfully
Your obedient servant
Perrin Barker

P.S. The land patent which you left in my care I have an opportunity of selling for —— provided I could obtain a lawful convey within two months.

Respectfully yours,
Barker

N.B. Mr. Graham has returned from his ———— up the St. Peters in good health and wishes to be remembered to you. He regrets that he could not have seen you before your departure and says that in consequence of want of time before the mail closes he cannot write to you, but that he will write at the first opportunity.

Yours etc.

P.B. I have made two additions to this letter already and I will now add that what may happen to effect my own feelings I have resolved to remain in my present situation for your interest and hope for better times.

Dr. E. Purcell
P. B.

Among the papers of Alexis Bailly, an early trader here, in the Minnesota Historical Society, may be found two references to Purcell. The first, dated at St. Peters July 17, 1822, is an agreement between Edward Purcell and Peter Powell, the latter indenting his son William to Purcell for a period of three years as a servant, Purcell to clothe, maintain and lodge him and pay him four dollars per month. The second item is a memoranda of goods sold to Purcell by Bailly. It is worth giving in full as it shows the prices prevalent in the wilderness and the cost of transportation.

Alexis Bailly Dr. Doct. Purcell

1823		
Augt. 26—	to 2 prs. Socks	1.50
	" 1¾ yd. blk. Silk	2.63
1824		
Jany. 20	"9 galls. Brandy @ 3.50	31.50
	" 1 keg to contain it	.75
	" 2½ yd. Sup. fine cloth	30.00
	" 1 pcs. Callico 28 yd. 50¢	14.00
	Transportation of the above to St. Peters	3.50
	Dolls.	83.88

Bailly also makes a memorandum that he is to purchase a clasp for Dr. Purcell but could not get one.

In a letter among the Johnson papers in the Carnegie Public Library at Sault Ste. Marie, dated at the Falls of St. Anthony Feb. 19, 1824, to a Mr. George Johnson, Purcell regrets that his duties had made him "unable to pay more attention to you than I have. . . . I present to you with this scrall a Lancett, it may be of use to you in the woods, it has been in my possession for many years." George Johnson was a fur trader and later Indian agent.

In 1823 one John Marsh came to Ft. Snelling as tutor to Colonel Snelling's children. Dr. George D. Lyman in his book "John Marsh, Pioneer" suggests that March may have studied medicine under Purcell. If this was so then we must credit Purcell as the first to give medical instruction here.

There remains but little more to be told except that Doctor Purcell was the first United States officer to die in Minnesota, and also the first physician. The cause of his death is not recorded but it is said to have been sudden. He was buried at the post cemetery at Fort Snelling. Some thirty-five years ago the cemetery was moved and all records of burials in the old cemetery are now lost. Although Purcell died January 11, 1825, it was not till 1830 that administrators of his estate were appointed by the court of Wayne County, Michigan (at Detroit) and the final probate papers bear the date 1832. Strange to say the only information regarding him in these prolonged proceedings is that he was "late of the United States Army." No title, no date of death, no place of death, nor are any heirs mentioned either by name or implication. The only statement is that $1425.96 remained to be distributed.

REFERENCES

1. *Minn. Hist. Coll.*, 6: 478.
2. *Ibid.*, 6: 95.
3. *Minn. Hist. Coll.*, 1: 473.
4. Three Score Years and Ten.
5. History of Minnesota. Vol. I.
6. Statistical Report of the Sickness and Mortality in the Army of the United States compiled from the records of the Surgeon General's and Adjutant General's offices, embracing a period of twenty years from January 1819 to January 1839. Prepared under the direction of Thomas Lawson, M.D. Surgeon General, Washington, 1840.

THE BLOOD LETTING CONTROVERSY IN THE NINETEENTH CENTURY

By B. M. RANDOLPH, M.D.

CHARLOTTESVILLE, VA.

WHEN we reflect that physicians of an earlier time saw the same diseases as ourselves, were possessed of the same five senses, were equally earnest and conscientious, and that about the same proportion then as now were endowed with common sense, it does not seem reasonable to look upon them as being so incompetent and impractical as we are disposed to do.

We have the advantage of living in a period when research into the material world has made trite for us knowledge which was hidden from them. For making our observations we have instruments of precision almost too numerous for our own good; whereas they had to depend on judgment alone.

Then, as now, speculation and hypothesis supplemented exact knowledge. Then, as now, contemporaneous authority prescribed which speculations should have credit. In the first century the elder Pliny said of doctors: "Whoever among them has a talent for discourse, immediately becomes the absolute arbiter of our life and death." Today we might substitute *publicity* for *discourse.*

Hypotheses are useful, as the atomic theory, and the side chain theory of immunity; but it is important not to accept them as demonstrated facts. There is little doubt that some of the hypotheses accepted today will seem very absurd to the science of the future. The fact that a man has adhered to an erroneous hypothesis by no means convicts him of being incompetent.

Edmund Barry, the leading English authority on phthisis in 1728, maintained that the lesions of consumption were due to minute particles of metallic iron floating in the blood, causing abrasion of the blood vessels of the lungs, with resulting ulceration.

Magendie, whose name recalls to us the anatomy of the brain, was highly considered by his contemporaries, for his treatment of hydrophobia. He injected water the allopathic contrary of the disease directly into the veins. The fact that the patients all died, some of them of sepsis, did not dampen the ardor for this treatment while it was a head liner.

Laënnec advocated the use of large and frequent doses of tartar emetic in pneumonia with much more conviction than did Barry that of asafoetida in consumption.

Neither learning, intelligence, nor even genius will protect us from error, when we begin to place hypothesis on the same level as fact. It is a curious thing that the same physicians who by empiricism were able to recognize cinchona as a specific in malaria, and to use digitalis wisely in heart disease, should be equally convinced of the efficacy of blood letting as a cure for inflammation. Not until sceptics, led by Skoda, a therapeutic nihilist, began to get better results with no treatment, did the old theories collapse, and the period of promiscuous bleeding come to an end.

In order to understand the mental processes of the physicians of an earlier day, it must be remembered that their pathology was impressionistic, and their therapy doctrinal. Cure of disease was still casting out evil spirits, the disease entity being considered a hostile invader, which must be destroyed, regardless of the effect of the remedy on the invaded territory, the human organism. Galen's doctrine of *enantion*, or contraries, was still accepted, the only question being what was the specific contrary for each disease. The treatment of inflammation was "antiphlogistic." The symptoms of inflammation, heat, redness, swelling were in themselves regarded as injurious phenomena. Whatever caused them to subside was in their eyes obviously beneficial to the patient. Antiphlogistic remedies were bleeding, mercury and antimony, and of these bleeding was the chief.

It is not within the scope of this paper to review the entire history of blood letting. With alternating periods of excess and moderation it is about the only remedy that has held its own throughout our history. In the late medieval and early modern periods it was as common as a hair cut is now. People went to barbers to be bled without medical advice. The literature of the time, both incidental and satirical teems with references to the practice. That it was regarded as a normal routine factor in human existence is shown in the curse of the medieval Bishop Ernulphus, which was rescued from oblivion by Sterne:

> May he be cursed in living, in dying, in eating, in drinking, in hunger, in thirst; in fasting, in sleeping, in slumbering, in walking, in standing, in sitting, in lying, in working, in resting, in urinating, in defecating, and in blood letting.

Authority had thoroughly educated the public to expect venesection, and undoubtedly a physician would have lost caste had he neglected this remedy. In spite of the fact that, from Pythagoras down, there were occasional individuals who questioned the merit of the practice, and of the savage satire of eminent writers like Molière, Montaigne and Le Sage, very little impression was made on the vogue of bleeding. Men with canny common sense, like Sydenham, Stokes and Graves, while they accepted the teaching of current authority, were comparatively moderate in their personal employment of blood letting. Bouillaud in Paris, and Watson, who led English medicine in the decade that followed Addison and Bright, probably took more blood from patients than any physicians in any age. Bouillaud bled "*coup sur coup*," time after time. Watson said: "I am in favor of its free, I might almost say, prodigal employment." Marshall Hall, M.D., F.R.S. (1839) presents the contemporary concept of the rationale and indications for bleeding in a way that makes him worth quoting: "Of the remedies of medicine blood-letting ranks preëminently as first. . . . Place the patient upright and looking upwards, and bleed till incipient syncope."

Bleeding to syncope (*deliquium*) in the recumbent posture, ran the risk of taking too much blood. The advantages he claimed for his technique were: (a) It insured the extraction of enough blood, that is, as much as could be safely withdrawn. (b) It guarded against excessive loss of blood. (c) It was very valuable as a diagnostic measure, especially in the differentiation between inflammation and irritation; for patients with irritation tolerate loss of blood badly, as compared with those suffering from inflammation, and experience *deliquium* much sooner.

He also presents what he considers the standards of tolerance of blood loss in health and disease:

Average persons in health faint on losing 15 ounces. In congestion of the brain or apoplexy, 40 to 50 ounces. In inflammation of the serous membranes, 30 to 40 ounces. In inflammation of the parenchyma of organs, 30 ounces. In inflammation of the skin, mucous membranes, erysipelas, bronchitis, dysentery, 16 ounces.

The following have a diminished tolerance: fevers and eruptive fevers, 12 to 14 ounces, delirium tremens and puerperal delirium, 10 to 12 ounces; laceration or concussion of the brain, 8 to 10 ounces; accidents, before the establishment of inflammation, 8 to 10 ounces. After inflammation supervened, they bore the loss of blood in larger amount, intestinal irritation, 8 to 10 ounces; Dyspepsia and chlorosis, 8 ounces; cholera, 6 ounces.

It was about this same time that independent minds were beginning to doubt the efficacy of bleeding as it was practiced, and to collect statistical evidence to determine the question. We have spoken of Skoda in Vienna who gave a series of pneumonia cases no treatment at all, and got results hitherto unequalled.

Louis in Paris claimed that the influence of bleeding in pneumonia was much less than was supposed:

> We cannot cut short pneumonia by blood letting, at least during the first days of the disease; and if the contrary has been believed to occur, it is, doubtless, owing to the disease having been confounded with others; or, because, in some rare cases, the general symptoms diminish after the first bleeding; still the local phenomena, crepitation, &c., for the most part continue to advance with no less certainty.

Barlow of London (1858), like men with common sense in all ages, conformed to authority, but left the way open to protecting his patients at the same time:

> Bleeding has undoubted power in controlling pneumonia in the first stage; in healthy subjects, therefore, where we have good proof of its presence, and where there is no disease of the heart, blood vessels, or kidneys, the patient should be placed in the sitting posture, and the blood allowed to flow from a vein in full stream, until the patient feels the signs of fainting, or, until the pulse becomes softer; or, if it have been before contracted, fuller; or, until the sense of oppression in the chest is diminished.

In view of the foregoing limitations, it would be strange if Dr. Barlow could not protect his patients against excessive loss of blood.

In 1848 Condé of Cambridge edited an edition of Watson's "Practice," in which he warned against bleeding practiced too freely in pneumonia, or kept up too late in the disease.

In America Dunglison (1848) conformed to the current teaching, advising bleeding early in pneumonia, but questioned its employment later in the disease. "The extent to which the abstraction of blood should be carried, has, however, given rise to much diversity of opinion."

Gerhard (1860), he who differentiated typhoid from typhus fever, though a pupil of Louis, followed Bouillaud in the treatment of pneumonia. He did say, however, that bleeding should be guided by the condition of the patient rather than by a standard technique.

As the medical profession weakened on the virtues of phlebotomy, they for the most part tried to procure the same effect of depression by the excessive use of mercury and tartar emetic. To make one realise how accepted authority controlled independent minds, I quote the following from Laennec, written before he became a convert to the treatment of pneumonia by antimony, as advocated by Rassori, of Milan:

> From the time of Hippocrates to the present day, most medical men have regarded pneumonia as one of the diseases in which blood-letting is productive of the most striking benefit. To this general truth all good practitioners have admitted only a few occasional exceptions; and it has only been by some few theorists and medical heretics that its employment has been proscribed.

The credit for undermining the antiphlogistic doctrine of treatment of inflammation in general, and of pneumonia in particular, belongs to Skoda and Dietl in Vienna; and to Louis, Grisolle, Chomel and Andral, in Paris. The first English protest that I have been able to find is that of Dr. Anthony Thompson (*Lancet*, 1846). He admitted that the extraction of a moderate amount at the onset of a pneumonia was beneficial, but claimed that, after the occurrence of consolidation, bleedings not only do no good, but are harmful.

It is chiefly to Dr. John Hughes Bennet of Edinburgh that the credit of changing the attitude of British authority on bleeding is due. His "Clinical Lectures on the Principles and Practice of Medicine" (1860) is the first work I find in English that seriously undertakes to correlate clinical medicine with pathology. He formally presents the theory that the phenomena of inflammation, instead of representing destructive activities of a hostile invader, are evidences of vital and conservative processes of nature; they are therefore to be aided by therapy, and not suppressed.

As clinical evidence in support of his theoretical arguments, he presented statistics of carefully controlled observations in his hospital over a period of eight years. He offered a series of what he called "propositions," supporting them with relentless logic, and with a pathological insight which was remarkable, in view of the fact that the work of Pasteur on infection was yet to come. The "propositions" are as follows:

1. That little reliance can be placed on the experience of those who, like Cullen and Gregory, were unacquainted with the nature of and the mode of detecting internal inflammations.

2. That inflammation is the same now as it has ever been, and that the analogy sought to be established between it and the various types of fevers is fallacious. (*Note:* This referred to the claim of Allison and others that the reason why bleeding was no longer so effective as in the past was due to the change in the nature of inflammation from a sthenic to a typhoid type.)

3. That the principles on which blood letting and antiphlogistic remedies have hitherto been practiced are opposed to a sound pathology.

4. That an inflammation, once established, cannot be cut short and that the object of judicious medical treatment is to conduct it to a favorable termination.

He offers the following statistics of the comparative mortality from pneumonia treated with and without bleeding:

Dietl, Vienna. With venesection, 85 cases; mortality 20.4 per cent. With tartar emetic, 106 cases; mortality 20.7 per cent. By diet, 189 cases; mortality 7.4 per cent.

Louis, Paris.

Venesection between first and ninth day, 78 cases; mortality 36 per cent. Early bleeding followed by tartar emetic; 27 cases; mortality 14 per cent.

Rasori, Milan.

By tartar emetic alone, 648 cases; mortality 24 per cent.

Grisolle, Paris.

By venesection only in early stage, 50 cases; mortality 10 per cent. By bleeding in the second stage, 182 cases; mortality 18 per cent.

Royal Infirmary, Edinburgh, 1839 to 1849.

By antiphlogistic methods (i.e. tartar emetic, mercury and one or more bleedings), 648 cases; mortality 34.7 per cent.

In the Same (By *Bennett*).

Without antiphlogistic methods, 78 cases; mortality 4 per cent.

Bennett's position was vigorously attacked by his contemporaries, and capably defended. He notes that the practice of bleeding had already begun to wane in England at the time when discussion of the subject was most acrid. After 1860 we find practically no advocates of the antiphlogistic doctrines that were universally accepted by medical authority only a few years before. That the use of bleeding did not completely disappear is shown by the following quotations from American authorities in the last quarter of the century:

Austin Flint, 1881:

> The infrequent use of the lancet now, contrasted with its frequent use forty years ago, constitutes one of the most striking of the changes in the practice of medicine which have occurred during this period. It can hardly be doubted that this measure was formerly adopted too indiscriminately, and often employed too largely; but, the natural tendency being to pass from one extreme to another, the utility of blood letting in certain cases, at the present time, is perhaps not sufficiently appreciated.

Flint goes on to advise its employment in pneumonia and pleuritis strictly as a palliative in sthenic cases. He emphasizes the contraindications to its use.

Pepper and Starr, 1885, present strong arguments against antiphlogistic methods, bleeding included. They stated that the local lesion in pneumonia no more requires general treatment than do the intestinal ulcers in typhoid fever. They admit that venesection may sometimes postpone imminent death from asphyxia. They merely echo the arguments of Bennett, which had now become accepted authority.

Alfred Loomis, 1892: Loomis reviews the available statistics furnished by the world's literature on pneumonia, and finds a grand average mortality of 20.1 per cent. His own series of 255 cases furnishes a mortality of 34 per cent. He condemns all antiphlogistic remedies, bleeding, antimony, mercury; he has also little opinion of the value of aconite, veratrum and the iodides.

William Osler, in the first edition of his "Practice of Medicine" 1893, says: "Pneumonia is one of the diseases in which timely venesection saves life."

In the fifth edition of the same work we find: "To bleed at the very outset in robust, healthy individuals, in whom the disease sets in with great intensity and high fever, is, I believe, a good practice."

In the eighth edition, 1912, the same statement is repeated, and the following added: "Late in the course marked dilatation of the right heart is the common indication. The quantity removed must be decided by the effect; small amounts are often sufficient."

There is no guild that has received more unfavorable criticism in all ages than that of medicine. By no means the least of this criticism has been uttered by physicians themselves. Human nature is prone to praise and to blame extravagantly. Justice is due to the men of each generation. The purpose of history is to enable us to form just judgments, and to profit thereby. In estimating the opinions and practices of the past, it is important to consider the tools with which the older men had to work, as well as the cultural background that molded their method of thought.

It may be well for us neither to judge our colleagues of older days too severely, nor to take too much credit to ourselves. Furthermore, we must remember that future generations will pass judgment on us.

One questions whether even today the indications for blood letting have been finally established on scientific foundations. There can be no question that in the past the practice has been a cause of much evil. The revulsion against its extravagant use was such that, for a time, it became well nigh obsolete. As Flint said, it is the natural tendency of human nature to go from one extreme to the other. Sufficient time has elapsed since the bitterness engendered by this controversy came to an end, for us to reconsider the question without bias. Already there are recognized situations in which venesection is accepted by authority as the proper therapeutic procedure.

Looking backward, one cannot but wonder whether the chief remedy employed by the medical profession from the time of Hippocrates to that of Pasteur was after all the unmitigated evil that it is commonly considered to have been; whether its benefits may not have been greater than we believe to have been the case; and whether the actual harm done humanity by phlebotomy was any greater than that done by the mercury and antimony that supplanted it.

To reach a sound judgment as to the rational indications for blood letting, it would be futile to renew the type of speculative argument that characterised earlier discussions of the subject, even in the light of more modern conceptions of physiology and pathology. If such an attempt is made, it should be by the accumulation of data of actual observations made by competent clinicians and physiologists. Such data should consist only of facts, and not be clouded by a superstructure of speculation.

A SHORT HISTORICAL SKETCH OF OSTEOMYELITIS*

By JUSTUS C. PICKETT, M.D.

CLEVELAND, OHIO

THE earliest records available which show a knowledge of diseases of bone are found in the Smith Papyrus[1] which covers a period somewhere between 5000 and 3000 B.C. At that time compound fractures were known about, also suppuration and particularly caries. These were treated along with all other inflammatory conditions by poultices of ground snakes, frogs and puppies, as well as with decoctions of the various herbs. Other remedies were devised and used during the following century, but further progress was not marked during the remainder of the Egyptian Period.

The Hindus, whom we know to have been skilled surgeons, were responsible for many of the early operative procedures and devised adaptable splints which were made of light wood. The Chinese used many herbs and also devised and used small pieces of inflammable wood which were called moxa. These were placed on the skin over the inflamed or painful area and ignited. They burned slowly, producing a counterirritation. They were used through many centuries and were still advised by Dupuytren in the nineteenth century. During this early period medical knowledge and therapy were possessed and used almost entirely by priests, mystics and healers.

Hippocrates, the outstanding individual of his time, wrote wisely of compound fractures and wounds. He advocated splinting in the former, saying "rest and immobilization are of capital importance." In describing the symptoms of suppuration and the use of medicated dressings he said that they should be applied "not upon the wound but around it." Galen in 131 A.D. wrote of compound fractures and described "laudable pus" in the treatment of wounds. No further progress was recorded in European medicine for nearly thirteen centuries until Theodoric in 1266 advocated the dry treatment of wounds and opposed Galen's doctrine of "laudable pus" and its desirability in the process of healing. Wine was frequently used as a dressing for wounds and spiritous drinks were given to stimulate healing. These views were also upheld by Henri de Mondeville (1260–1320) who attempted to avoid suppuration by cleanliness and advised irrigation of infected wounds with boiled or pure spring water. Guy de Chauliac (1300–1368) reverted to Galen, however, and taught that wounds were "healed best" by surgeons who treated with salves, plasters, etc., and not by nature alone. He was followed by Paracelsus who agreed with Mondeville on the maintenance of strict asepsis by cleanliness.[2]

In the sixteenth century amputation was the common form of treating badly injured extremities and gunshot wounds. Paré and his pupil Joubert, writing of this in the early part of this century, stated:

> As for some Empiricks who treat simple wounds merely by the application of

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*From the Division of Orthopedic Surgery, the Lakeside Hospital.

> linen, either dry or soaked in water, and sometimes cure them, it is not necessary to believe there is enchantment or a miracle, as do idiots and the populace, but merely in the beneficent action of nature, who cures wounds, ulcers, fractures, and other ills. For the surgeon does no more than aid her by removing the hinderance as pain, flexion, inflammation, infirmity and other things that cannot be moved by nature alone.[3]

Paré was led to this statement by his experience in treating patients with gunshot wounds. A simple dressing of egg-yolk, meal, etc. had been applied to several amputated extremities for want of the scalding oil generally used, and much to his surprise these cases showed the better result, being free from fever and having less pain on the following day. Paré also removed bone fragments from compound fractures in addition to using the poultices commonly advocated.

William Clowes, the outstanding English surgeon of this period, expounded his treatment in a "Treatise on Gunshot Wounds" which was said to be "the best Surgical Writing of the Elizabethan age."[4]

The early terminology of infectious diseases of bone shows a lack of complete differentiation between tuberculous, luetic, and pyogenic involvement.

"Caries" of bone was first described by Doctor Alexander Munro of Edinburgh in 1740.[5] His comprehension was such that I quote from his writings: "Ulceration of the osseous tissue may be owing either to local injury or it may result from constitutional indisposition, such as syphilis, scrofula, or a deficiency of nutrition in consequence of old age or deprivation." Under symptoms he states:

> The disease is usually first ascertained where there is no external ulceration, by an obtuse and more or less deep-seated pain which appears to issue from the bone; a swelling or protuberance of bone or periosteum in the part affected; tenderness to the touch; a red inflammatory appearance to the skin; and a loose or flabby feel of the superincumbent integuments.

He recognized that the disease was apt to terminate less favorably in vertebrae and the articular extremities of long bones than elsewhere. The treatment advised was directed toward any constitutional disease present: local treatment of the inflammation, rest of the involved parts, and removal of fragments of diseased bone as rapidly as they became detached. The local treatment consisted in leeches, fomentation, emollient poultices and frequent washings with soap and warm water. Counterirritants were applied only for superficial inflammation. For deep-seated infection he advised incision and cauterization with removal of fragments. (It was a frequent practice in those days to sear the involved part with a hot iron through an open incision. The parts so treated then sloughed and were extruded.) Bread and milk poultices were applied to the open wound and the granulations were burned down with a hot iron. Amputation was advised where constitutional effects were observed from the local disorder.

Similar views were expressed by John Hunter.[6] His writings reveal how clearly he regarded the subject, for he wrote:

> In their specific diseases the bones also resemble the soft parts. But, unluckily for bones they can hardly swell; nor can their coverings swell without its being immediately suspected as venereal, so that mercury is often given to the detriment of the patient. The abscess

in the soft parts will generally make a passage for itself without the necessity for an artificial opening. This is not so in bone; if a spontaneous opening takes place it is not sufficient for a cure; therefore the trephine is often necessary; or, it may be necessary to destroy the living principal in the bone and then the actual cautery will be necessary.

He believed that bones in regard to their vital power did not require treatment which differed from the treatment of soft tissues, but he recognized the necessity for mechanical treatment of bones because of their solidity. His views on the physiology of bone were based on thorough study and are regarded as fundamentally true today. He recognized the formation of involucrum in the presence of the diseased bone and the latter's necessary presence for splinting until the new bone had formed. He also showed that the bone died when separated from the surrounding parts and periosteum. He wrote the earliest clear conception of the formation of sequestra and described the two divergent processes which must be active in growing bone; namely, deposition and absorption. He felt that rest was necessary for the parts involved and recommended a horizontal position for the affected extremities. His expressed views on surgical treatment are so outstanding that I have included them verbatim. "The last part of surgery, namely operations, is a reflection on the healing art; it is a tacit acknowledgment of the insufficiency of surgery. It is like an armed savage who attempts to get that by force which a civilized man would get by stratagem."

Because we today have advanced only a short distance beyond the treatment used at that time, a complete description of the care of a case would perhaps be interesting. Such a report is given by William Hey on "Caries of the Tibia."[7]

> Toward the conclusion of the year 1786 a young lady from Richmond in Yorkshire, consulted me on account of a small tumor in the anterior and middle part of the tibia. It had exactly the appearance of a common node, and had such a degree of softness in its center that I apprehended a small quantity of fluid was contained in it; though that could not from the thickness of the periosteum be distinctly felt.

He included the history of the case, consisting chiefly of high fever followed by pain in the leg. He recommended "Plummers Pill" with the "decoction of mezereon" and applied alternately mercurial ointment and ceratum saponis. He stated that the tumor diminished in size, and the discomfort was less. It again increased in size, however, the following spring and he said:

> The tumor was then larger and softer; and there remained not the least hope of curing my patient without discharging the matter, and afterwards treating the case as the state of the periosteum and tibia might require. Upon laying open the tumor I found the periosteum diseased and thickened; separated from the tibia and including a small quantity of purulent matter. The surface of the tibia was rough as far as the matter had covered it, and in the center of the rough part there was a hole equal in bore to a goose's quill which penetrated the bone transversely about one-fourth inch. As the bone was firm in the rough part and resisted the pressure of a probe, I thought it right to try whether the surface on exposure to the air would not produce good granulations. Therefore, after removing so much of the periosteum as I found in a morbid state, I dressed the wound simply.

This treatment was continued for two weeks and then he began to suspect that the hole mentioned above might lead into a cavity in the bone. He examined with a probe and discovered such a cavity. He stated that nothing could afford rational hope of a cure except amputation of the limb or exploration and removal of the diseased part. This was explained to the patient, and she consented to the latter. He described the operation as follows:

> I began the operation by dissecting the granulations of flesh which had arisen from the bone; and then sawed out, by means of a circular-headed saw, a wedge of the tibia 2 inches in length which I had previously marked at each extremity of the longitudinal cavity. This wedge was ½ inch in breadth and ¼ inch in thickness; and consisted entirely of the laminated part of the bone. The removal of this portion brought to view a caries of the cancelli almost as extensive as the length of the piece I had sawed out.

He further described removal of every bit of diseased bone by trephines and knives. The operation took two hours and the wound was dressed with dry lint. He stated that "granulations quickly filled the wound and the cure was complete." In his remarks he concluded that the abscess was formed as a consequence of the fever. As the fever declined the pain commenced and as the matter spread it grew in intensity. With perforation the pain stopped. He also reported two other cases with one cure in ten weeks and another in eighteen months with two operations. He felt that this type of treatment, namely, open drainage and removal of the sequestrum, was superior to the potential or actual cautery.

Dupuytren,[8] in 1800, described caries of the vertebrae and the accompanying abscess. Speaking of the abscess, he said, " . . . and when they were first opened whether spontaneously or artificially, the pus was without fetor and not sanious as in scrofulous cases, nor homogeneous and healthy as in simple inflammation." Like all other surgeons before the time of Pasteur, he attributed the decomposition of matter to the introduction of air. He did not believe the pus was derived from the bone because of the appearance of very large abscesses and only a small lesion of the bone or very little pus with involvement of several vertebrae. In addition, the appearance of the abscess at some distance from the lesion aided this view. He also said, " . . . early the inflamed periosteum exaggerates its nourishment, but in the more advanced stage when the inner surface of the periosteum pours out pus the nourishment is deprived and erosion, atrophy, and partial necrosis result." He was undecided whether to drain the abscesses or not because he felt that the bone lesion was often cured leaving the pus to absorb eventually or become organized.

John Syng Dorsey,[9] who was Professor of Anatomy at the University of Pennsylvania, wrote at great length on the treatment of necrosis of bone. In his conclusions he stated that the circumstances inducing surgeons to operate were:

> When great irritation is experienced from the dead bone,—when it can be easily removed in consequence of its superficial or exposed situation,—when the new bone incloses it or over-laps it in such a way that a long period will probably be required for its removal, and when the articulating extremities of the bone are sound, for if these be diseased,

amputation should be preferred to the extraction of the dead bone. It is a painful, difficult and hazardous operation at all times although often performed by British surgeons.

From the Memoirs of Baron D. J. Larrey[10] (Military Surgeon to Napoleon's armies), we find that amputation of the involved extremity was the chief form of treating compound fractures, gunshot wounds of bone, etc. Larrey reports having done as many as three hundred amputations in twenty-four hours during the Russian campaign. However, some of these were done because of trench foot. He also described the involvement of wounds by maggots during the Syrian campaign and was of the opinion that no harmful effects followed.[11]

Samuel D. Gross[5] (Professor of Surgery and Anatomy at the Jefferson Medical College of Philadelphia) divided the etiology of necrosis (osteomyelitis) of bone into local causes, such as blows, wounds, fractures and burns, and general causes, such as constitutional diseases and the effects of protracted and debilitating febrile illness. He described the dull, deep-seated pain that becomes violent, as well as the diffuse swelling and edema which increase until a natural or artificial outlet occurs. He said of treatment: "The first and most important object of the surgeon should be to aid nature in her endeavors to expel the dead portion of the bone and thus enable her to effect a complete and permanent cure." He described in detail the removal of sequestra and warned against the possibility of fracture by removing them too early without external splinting. The wounds were packed with dry lint and wet poultices of laudanum were applied. Repeated packing was advised.

We thus see that necrosis was recognized and written about very early. It also was known that acute inflammation occasionally followed injury to the bone in persons who were in poor health, and the morbid anatomy was recognized. Its cause was not understood, however, until the epochal discovery of bacteria by Pasteur about 1860 and the demonstration of the presence of bacteria in the abscesses. Pasteur also disproved the idea of a specific organism and showed that various forms of micrococci were the etiological factors. It was on this basis that Lister[12] first swabbed out wounds and compound fractures with lint saturated with carbolic acid. Over the wounds he placed a carbolic dressing covered with a piece of closely fitted tin. A crust was allowed to form, and although the region around the crust was cleaned frequently, the wound beneath it was never touched. Other forms of dressing, pliable and otherwise, and occasionally antiseptic in nature, were later substituted for the tin. Lister, however, did not realize that infection might be carried from one part of the body to another through the blood stream and set up a secondary infection there. Unfortunately, this idea remained prevalent in the minds of the medical profession although Chassaignac described osteomyelitis as a clinical entity in 1854. Lexer[13] in 1894 described and demonstrated the pathogenicity of microorganisms in acute osteomyelitis.[14]

Kluppel[15] reported the first case of sclerosing osteomyelitis in 1879, but it was not until 1891 that Garré[16] first described the unusual condition which bears his name. The sclerosing types are those with merely an enlargement and thickening of bone without the occurrence of suppuration and fistulae.

The usual symptoms consist in high fever, localized swelling, pain at the site of the bone lesion, and considerable infiltration of the soft parts. The skin is not reddened and there is no pus. The temperature falls and the swelling disappears, but the permanent osseous enlargement remains. Kocher's plan of injecting 2 per cent phenol into the inflamed and swollen periosteum was outstanding during the latter part of the nineteenth century. In addition the use of sodium benzoate was prescribed. In the early period, as well as at present, it was confused with syphilitic osteitis and sarcoma. Free incision of the periosteum with even guttering of the bone into the medullary canal is now practiced for the relief of pain. The specimen removed should be preserved to rule out malignancy. Cases frequently recur requiring a second operation.

In 1881 Hamilton advanced the idea of hastening healing by packing the cavity with sea sponges in order to furnish a scaffolding for the formation of new bone in the wound. In 1885 Kettling advocated sterilization of the cavity. Complete removal of the marrow by scraping and swabbing with carbolic acid and strong solution of bichloride of mercury were advised. This was followed by drainage with a large rubber tube. Similar attempts to sterilize the bone cavities in this way and obliterate them with aseptic foreign substances or living tissues continued until 1904 when Nichols[17] demonstrated that the bone marrow and endosteum were as important in the regeneration of the bone as the periosteum. He also showed that the thorough scraping and strong antiseptics delayed healing.

A supreme faith in the universal power of chemicals, however, led to their unreasonable use and to total disregard of the more important surgical precepts. At one time or another hundreds of so-called antiseptics have been relied upon as curative and then have been later abandoned. Lord in 1902 advised that Thiersch skin grafts be used to strengthen and drain cavities in bone. Beck[18] used sliding grafts, while later Reid[19] advocated Reverdin grafts for the same purpose. Muscle grafts also were employed. Dressman advised boiling oil and Moore[20] favored gutta percha packed in the cavities. Von Mosetig-Moorhof's[21] plugs of bone wax, which were thought to be antiseptic without acting as foreign bodies, and Beck's[22] bismuth paste were also used. Albee advocated sliding bone grafts to stimulate osteogenesis and to strengthen the part. Any wounds that healed without the usual antiseptic poultices, packs, irrigations, etc. were looked upon as interesting and unusual.

For many years acute osteomyelitis had been treated expectantly until Murphy, Cushing and LeConte[23] independently and within a very short time of each other advised immediate drainage, including perforation and even guttering of the bone as soon as the diagnosis is made.

This briefly summarizes the treatment of osteomyelitis up to the beginning of the World War. However, the high mortality from gunshot wounds and compound fractures in soldiers led to wide search for a universal remedy, and the Carrel-Dakin[24] treatment was employed wherever possible. This consisted in immediate drainage, careful placing of irrigation tubes, scrupulous aseptic technique in the irrigations at two hour intervals day and night, and in the change of dressing to avoid secondary contamination. The results when the personnel was careful and exacting were very good. The attempt to secure bacterial cultures from the hidden pockets before strapping the wound was not often successful and recurrences were numerous. This form of treatment was later supplemented by the use of dichloramine-T with similar results. The American surgeons at the time of our entrance into the War followed chiefly the method described by T. M. Markoe[25] of drainage tubes, packs, and irrigations.

During all this period the primary requisite in the treatment of painful injuries as established by Hilton[26] and Thomas,[27] namely, rest, was overlooked and overemphasis was placed on a disguised and misunderstood Listerism. Wound treatment was looked upon as a contest between the germs in the wound and the antiseptics employed, with the cavity regarded as a battleground. After all other forms of treatment had been carried out, the individual was given a chance to help himself and rest was given to the involved parts.

At the conclusion of the World War chronic osteomyelitis was regarded not only as an evil and a disability in itself, but the treatment and cure of accompanying disabilities were filled with consequences almost as bad. The persistent focus of infection and inflammation ever threatening to break out anew not only postponed active use of limbs but also prevented the use of passive motion and massage. The fear of postoperative recurrences constituted for the surgeon a source of great anxiety and for the patient a disaster always serious and often dangerous.

Several observers made competent and critical studies of all cases seen during the War, and a more logical form of treatment has followed.

Early in the war, Rutherford Morison (surgeon to Northumberland War Hospital) was dissatisfied with the treatment of infected wounds then used and he set about to find a more satisfactory type of therapy. His first results from the "Bipp" treatment showed many advantages under existing conditions and a more optimistic outlook as to final results.[28] His technique consisted in thorough cleansing of the skin with 1:20 carbolic lotion followed by alcohol. Complete mechanical debridement was done, bleeding was controlled and the wound was dried with spirit. A thin covering of the paste, consisting of 2 parts iodoform, 1 part bismuth subnitrate and sufficient liquid paraffin to make it pliable, was then applied to the entire wound, including cavities and ends of bone, and the wound was closed, if possible, by interrupted sutures of thick sterile silk which had been soaked in iodine and rubbed with the paste. Gooch splints were applied to the extremities. He states: "The dressing requires no change for days or weeks if the patient is free from pain and constitutional disturbance." When dressings were done, they consisted in merely wiping away the superficial discharge with spirit, as he believed the infected discharge from the surface of the skin in the neighborhood of the wound was the contaminating factor. Later results showed that it had been necessary to perform secondary operations in only a few cases and these were done for the removal of sequestra that appeared later.[29]

For several years Dr. H. Winnett Orr,[30] also believing that following drainage, rest and the avoidance of secondary contamination were the chief factors involved, has been very successful in treating both acute and chronic infections of bone. The principles involved by this method are: thorough drainage with complete mechanical evacuation of all dead substances. Wide and open drainage is maintained by lightly packing the wound with a non-irritating and non-absorbable substance. By changing the dressings only at long intervals, secondary contamination is avoided and complete physiological rest is maintained by fixation in plaster. Follow-up studies in large numbers of cases, treated by many individuals, have shown excellent results.

Modifications of these forms of therapy or of the Carrel-Dakin method are used in practically all hospitals today. Emphasis is usually placed on too much rather than on too little treatment, and the technique as described by the originators is not scrupulously followed. For this reason results are unsatisfactory and the usefulness of involved extremities is jeopardized. In acute infections roentgenological confirmation of diagnosis cannot be obtained before seven to ten days and too many are allowed to progress rather than risk unnecessary exploration.

During several engagements in the late war, maggots were observed in wounds of individuals who were not found for several days after they had been wounded. Strangely, these wounds appeared to be in much better condition than those which had been immediately flushed with antiseptics, and in addition the patients showed less systemic effect from the wound. This observation had also been made in the sixteenth century by Paré,[31] in the nineteenth century by Larrey, and during the Civil War by several of the military surgeons. During the last few years attempts have been made to substantiate experimentally these observations about maggots. The late Dr. William S. Baer[32] of Johns Hopkins was the outstanding individual in this field. As a result of experiments patients were subjected to carefully controlled treatment, and the results in chronic osteomyelitis, including several cases of tuberculosis, have been gratifying beyond expectation. The principles involved are: thorough exposure and drainage of the involved parts; complete mechanical eradication of the dead tissues, followed by the scavenger action of maggots that have been grown under conditions essential to the avoidance of introducing contaminating organisms. During this time the parts are maintained at rest. Asepsis is not strictly involved. The presence of an antiseptic or antibacterial substance in the maggot has been suspected but not yet identified as such. The rapid deposit of bone in cavities and in compound fractures has been a very welcome and useful accompaniment of this form of therapy. There are certain technical difficulties involved, but these can be overcome by care and diligence on the part of the personnel.

Within a brief period we have thus returned in one form or another to the early facts established by Paré, Lister, and Hilton, namely, asepsis rather than antisepsis; rest for the inflamed parts, and the use of non-irritating substances following early operation of acutely inflamed extremities. The treatment is prolonged and the care exacting. The courage required not to meddle frequently but to allow nature to do her work is great, but the final results have become more satisfactory in larger numbers of cases.

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MEDICINE IN THE ROMANCE OF PETRONIUS

By EVAN T. SAGE, PH.D.

PITTSBURGH, PA.

THE "Satiricon" of Petronius is not only the earliest existing specimen of prose fiction, but it is one of the few novels that have ever been made the subject of extended medical commentary. The half-century beginning with 1575 was a period of intense interest in Petronius, and in 1621 a French doctor named Moreau addressed to Lotichius, a physician and teacher of Frankfort, a series of seventy-nine medico-philosophical questions regarding Petronius. Six years later Goldast, who had, in 1610, published an edition of the "Satiricon," likewise appealed to Lotichius for information on medical points. His questions with the answers form the largest part of Lotichius' own edition of 1629. We can judge of the fullness of the commentary from the fact that for less than 100 pages of text there are more than 400 pages of notes. Of course much of this was padding and much is only remotely relevant. Moreau's questions, too, were sometimes only vaguely related to either medicine or philosophy: he asks whether the Romans served eggs hard-boiled or coddled, but he also asks whether Petronius' views on love-potions were sound; whether virility is affected by charms; whether women can cry at will; how poetic madness differs from melancholia and whether it can be cured by bleeding; why drunkards' eyes are bloodshot; what are the symptoms of tertian fever; whether seasickness is ever fatal; whether sausages are healthful, and so on. Goldast asks many of the same questions, and Lotichius answers them with painstaking care, quoting liberally from ancient writers on medicine and giving many prescriptions. Though only twenty-three years old when Moreau wrote to him, Lotichius already had some reputation, and was the author of treatises "De Febribus" and "De Gummi Gotta."

But the commentary of Lotichius is the business of a doctor, though I lean heavily on him in this paper, and my main concern is with Petronius.

Living in Rome in the time of Nero, whose advisor he was on all matters of good taste, Petronius employed his leisure in writing a long romance, dealing mainly with the lower classes of society, and this romance, the "Satiricon," is the oldest known example of prose fiction. Only a small portion has survived, and the longest single episode was unknown in Lotichius' day. Autobiographical in form, it relates the adventures of a young Greek, Encolpius, a man of education and wit, who, from necessity and from choice as well, prefers the life of a tramp. His companions change almost from day to day: merchants, harlots, priests, parvenu millionaires, poets; members of all classes, in fact, except the police and solid members of respectable society. Petronius tells their adventures with keen observation, fidelity to detail, vividness and simplicity. Among his other distinctions, he may claim that of having been the first realist, and it is his realism, I think, that gives him this small place in the annals of medicine.

With such a subject, it is no wonder that he has to describe cases of illness and accident. No doctors appear among his characters and I see no evidence that he himself had any professional training. He mentions these cases because they had foundations in real life. He was a man of unusual intelligence and extensive experience, who knew something of everything, and could make literary use of every incident. We should like to know what he thought of Celsus, the fashionable physicians at the court, the medical schools which were beginning to flourish in Rome, but we get no glimpse of them, since his characters could have no plausible contacts with them. Instead we hear something of how such people administered first aid treatment, what they thought of doctors, and how they tried to cure the ailments which they suffered from in their daily lives.

The longest complete section that we have (the one Lotichius did not know, unfortunately for us) describes the banquet of Trimalchio, a freedman of Oriental origin and enormous wealth. He has never gone to school (he boasts), but he has always had the knack of making two coins grow out of one. He has his own newspaper; his bookkeepers are always at least six months behind; he owns all southern Italy and plans to buy Sicily as well. Naturally he knows more about medicine than any doctor. He is not feeling well when the banquet begins, and when he returns after an enforced absence, he apologizes thus:

> You will pardon me, my friends; for some time now my stomach has been acting up and the doctors are stumped. However, a dose of pomegranate rind and resin dissolved in vinegar has helped, and I hope my digestion will begin to behave itself again. Why, sometimes there's such a rumbling in my stomach, you'd think it was a bull.

He becomes more specific about his symptoms, approves the doctors' warnings against false modesty ("no mortal man is born solid"), and asks his guests to feel no shame at leaving the table for worthy purposes (chap. 47, sects. 1–6). The prescription he mentions is probably one of his own devising: we know little about their use of pomegranate rind, but resin dissolved in vinegar was a stock remedy for toothache, and vinegar, as we shall see, was the most important item in the home medicine chest.

The success of the dinner seems to benefit Trimalchio's health, for he assumes later a charitable tolerance toward physicians and even shows a grudging admiration for them: "After literature," he asks, "what do you think are the most difficult professions? I say medicine and money-changing. The doctor has to know all about the insides of us poor fellows and when the fever comes, even if I do hate them like the devil because they always put me on a diet of duck's meat. The money-changer has to see the copper underneath the silver" (chap. 56, sects. 1–3). A diet of this kind was a standard cure in Rome: Plutarch tells us that the elder Cato relied on duck and cabbage to keep his household well. One of Trimalchio's guests is harder on the profession. He says of a dead friend, "It was the doctors who did for him, or rather his bad luck, for a doctor's no good except to ease your mind" (chap. 42, sect. 5).

In several passages Petronius uses language which suggests that he recognized the kinship between genius and insanity. In his usual manner, however, he reduces it all to a joke, for it is the essence of Petronius that he can never be serious for long. On one occasion a poet has just delivered an extemporaneous poem and has been chased away by a shower of stones from his involuntary audience. Encolpius expostulates with him thus: "Tell me, what do you mean by these spasms of yours? . . . I am not surprised that the public gives you a stony reception. I'm going to fill my pocket with stones, and the minute you show signs of going out of your head I'll let some blood and cool you off" (chap. 90, sects. 2–4). Lotichius does not answer Moreau's query regarding this passage, and we must not make too much of this jocular allusion to rough and ready surgery, but it is clear that Encolpius is not far wrong on the anticipated effects of bleeding.

On two occasions members of the company suffer wounds (chap. 98, sect. 7 and chap. 136, sect. 7). One has his forehead cut open in a fight, the other has his shins pecked by a goose. In the former case the cut is dressed with cobwebs soaked in oil, and Lotichius has a great deal to say about it. Both the spider and its web, according to the ancients, had medicinal properties. The spider, either alive or pulverized and dissolved in certain liquids, was used for fevers, earache and rabies. Spider-oil was an ingredient in various medicines for which Lotichius gives the formulae, and his comments sound suspiciously like those which extolled the virtues of that panacea of my childhood, snake-oil. The web, ground up and mixed with certain ointments, relieves fever, and when taken internally is an efficient purgative. Cobwebs alone, says Dioscorides, will stop a hemorrhage and relieve inflammation from a surface ulcer. Oil was of course a familiar dressing for cuts and small wounds, with soothing if not healing properties.

Lotichius credits Petronius with a good deal of technical knowledge, but it seems to me equally possible that he is merely recording actual emergency treatments and the use of empirical remedies of the household, some of which had won professional approval. One of these was the use of olive oil as a dressing; another was the use of cobwebs to stop a flow of blood. A Dutch scholar of the sixteenth century tells us that the same combination was used in his time, and I have read somewhere that even in our day cobwebs, cornsilk and similar substances are used by farmers in emergencies for such purposes. We all recall how in the nursery rhyme "vinegar and brown paper" was employed for the benefit of Jack's broken head.

In the other case the cuts are washed with vinegar. Again Lotichius writes a long chapter, with many quotations from Dioscorides. Among other properties ascribed to vinegar is that of staunching a flow of blood, whether taken internally or applied externally. Galen confirms this statement, and this too must be regarded as a home remedy that had won medical approval. Few substances in antiquity had such varied uses. We have already seen examples of its internal use, and one wonders whether it was not vinegar rather than wine that was used by the Good Samaritan. Soured wine must have been available everywhere. It was a component of the soldier's ration, and in the field and on the farm there must have been many cases in which the value of vinegar as an astringent was observed. We should remember in this connection that acetic acid was the only one known to antiquity.

One of the most important sections of the "Satiricon" deals with the attempts to restore to Encolpius his lost virility. In this we are almost compelled to believe that Petronius had listened to some self-styled specialist in diseases of men as he prescribed for his patients. The transition from purely medical to magical methods can be seen, but the border line between them can not be located precisely. Lotichius has a pious horror of the latter, but not even he can make a sure distinction between them. The first part of the treatment is self-administered and, apparently, self-prescribed: "I skipped the bath and anointed myself only in moderation. Then I dined on strengthening foods—onions and snails' necks without sauce, and drank a little wine. Then before going to sleep I took a gentle stroll to settle myself down, and went to bed alone" (chap. 130, sects. 7–8). Ancient medical authority regarded the complete routine of the bath as enervating, and when we think of the complexity of the process, which included anointing and massage, we are inclined to agree. Encolpius does not say so specifically, but Lotichius is no doubt right when he says that the ointment was applied only to the affected parts. Antiquity knew stimulating ointments, and this restraint would avoid the debilitating effects of the entire treatment while aiding in accomplishing the ultimate purpose. The diet selected is judicious: Dioscorides and the elder Pliny both say in effect of onions *Venerem stimulant*, though Ovid, who should have known, questions their efficacy. We have no similar remark regarding snails, but they were a regular part of luxurious feasts, and their necks may have shared the invigorating qualities attributed to the necks of ducks by Martial. Pulverized snails were an ingredient in certain seasonings designed to stimulate sexual activity, and I think we may feel sure that the ancients were fully acquainted with the food stuffs which would excite or inhibit sexual desires. While antiquity was fond of associating Bacchus and Venus, their partnership was more effective at a later stage, and all medical authorities agree in counselling the avoidance of excess under these conditions. The value of moderate exercise, like that of abstinence, is obvious. The whole regimen then seems well-planned, whether it was the result of experience or of medical advice.

Unfortunately it is not successful, and Encolpius is compelled to resort to measures which involve both magic and medication. Petronius did not care to fix the boundary, if he could; Lotichius could not, and I can merely describe those parts of the ceremony which seem to have some possible medical significance, ignoring the accompanying incantations. The old witch Oenothea who administers this treatment employs a suppository in the form of a phallus smeared with oil, ground pepper and nettle-seed, and applies externally a compound of watercress, aromatic gum and nettles (chap. 138, sects. 1–2). Lotichius has some surprising examples of unexpected effects produced by ordinary suppositories, though these are derived from records of his own contemporaries. The oil was of course a lubricant. The medical writers have little to say about these drugs, though Pliny the

Elder says that nettle-seed and watercress were stimulants, and advises the use of this gum on animals. But Juvenal and Ovid mention pepper and nettle-seed in such contexts, and we seem justified in inferring that they were among the illicit and somewhat disreputable medications in popular use in situations where physicians in good standing were not consulted. There is therefore some scientific or pseudo-scientific basis for Oenothea's theory of the art of healing, though one wonders how efficacious it would have been without her charms. We never learn, for the treatment is too painful to be endured, and Encolpius attributes to the intervention of Mercury his final recovery, and one wonders whether there may be a pun concealed herein (chap. 140, sect. 12).

Petronius is then surprisingly exact in his acquaintance with the medicine of his time, though it is in the main popular and amateur medicine which he knows. It is his task, as he sees it, to depict mankind as he is. If mankind resorts to quack doctors and trusts astrology and magic, Petronius records the facts, exaggerating them just enough to make the whole romance a kind of subtle burlesque. Medicine interested him, just as every other human activity interested him. He knew something of it, mainly by observation, just as he knew something of almost every mental activity, and displays in many fields a precision of information that is almost technical. His Encolpius is a man of education, who is still ready to appeal to the supernatural when the natural fails. In that he is true to his time and to his type, and the attainment of this fidelity to time and type is Petronius' literary purpose. At any rate, Petronius displays none of that unreasoning hostility that led his contemporary, the elder Pliny, to say, "Doctors learn at our peril and our deaths advance their knowledge; the doctor alone enjoys complete impunity when he kills a man."

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ADDITIONAL PALEOPATHOLOGICAL EVIDENCE OF PAGET'S DISEASE

By ALTON K. FISHER

MILWAUKEE, WIS.

DURING the summer of 1929 the Archeological Field Party of the Milwaukee Public Museum devoted part of the season to the investigation of a group of prehistoric mounds located about two miles north of the village of Lynxville in Crawford County, Wisconsin, and not far removed from the shore of the Mississippi River. As a result of the excavations at this site, it was possible to collect a considerable quantity of poorly preserved human skeletal material, and included in this lot of material were the two bones with which this paper deals. These two specimens, a pair of tibiae, were in a somewhat better state of preservation than most of the other skeletal material. In view of the pathological nature of these tibiae it would have been especially desirable to have had the remainder of the skeleton for examination, but unfortunately the only other part of that skeleton which could be preserved was a portion of the mandible. The appearance of Dr. Henri S. Denninger's paper on the "Paleopathological Evidence of Paget's Disease"[1] suggested the advisability of publishing the data on these specimens in the near future, and accordingly they were thoroughly studied and the findings are submitted below.

There is no need to enter into a description of Paget's disease here, for Dr. Denninger has done that in the paper referred to. It will be noted that I have included no references to the literature bearing on Paget's disease, for Dr. Denninger has done that also, and I am unable to improve on his bibliography.

The left tibia is complete except for a small amount of post-mortem destruction at its proximal end, but the right one consists of only the distal two-thirds of the bone with a partial destruction of the shaft near the distal end. Both tibiae exhibit a marked anterior bowing, but they are practically free from any lateral distortion. The middle one-third of the shaft of the left tibia is thickened so that its maximum transverse diameter is 28 mm., and 44 mm. is its maximum antero-posterior diameter. The same condition is apparent in the region of the distal portion of the middle one-third of the right tibia, the maximum transverse diameter being 26 mm. in this case. While the thickened portions of the bone do not appear to be porous, the mouths of the Haversian canals appear to be enlarged on the medial aspects of both specimens in the middle thirds. The thickened portions of the tibiae present no abrupt, abnormal bony protuberances, but instead, the elevations on the bone are accomplished through gentle, gracefully molded slopes which terminate in broadly rounded and expansive eminences. The surfaces of these masses of abnormal bone are marked by shallow grooves which were produced in life by the pressure of adjacent blood vessels. The general appearance of the specimens suggests that they attained their present form as a result of a succession of slow, gradual pathological changes which extended over a long period of time.

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[1] Ann. Med. Hist., n.s. 5, No. 1 (Jan.) 1933.

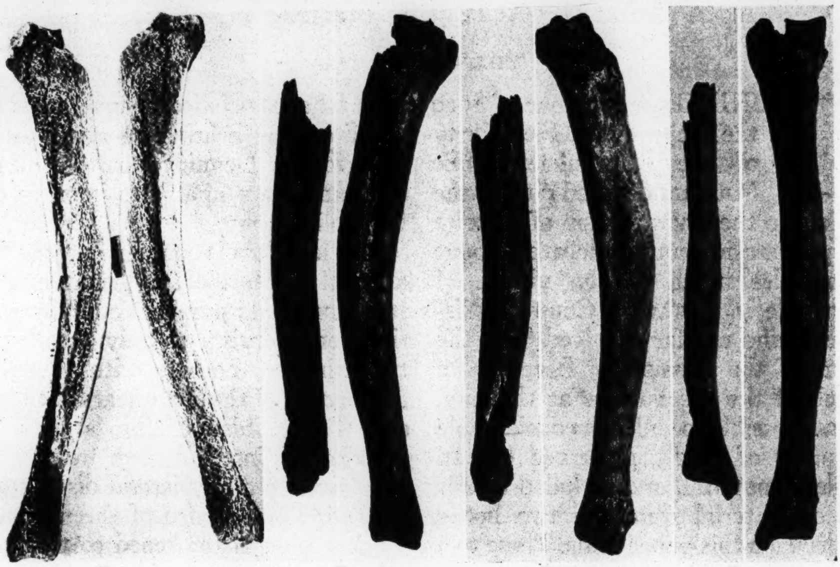

FIG. 1. FIG. 2. FIG. 3. FIG. 4.

FIG. 1. PREHISTORIC INDIAN TIBIA, SHOWING EVIDENCE OF PAGET'S DISEASE, AND SECTIONED TO SHOW ENCROACHMENT UPON MEDULLARY CANAL.

FIGS. 2–4. PREHISTORIC INDIAN TIBIA, SHOWING EVIDENCE OF PAGET'S DISEASE.

The more complete of the two bones was sectioned longitudinally and upon examination of the interior it was at once apparent that the medullary canal had been encroached upon. Measured along the line of the maximum antero-posterior diameter, the anterior 25 mm. of the tibia was composed of cancellous bone and the more compact sub-periosteal bone. When viewed with the naked eye this cancellous bone appeared homogeneous throughout, but when it was examined under the microscope with a low magnification there appeared to be a somewhat heavier cancellous tissue in the region of what might have been the original compact bone. Macroscopic observation revealed no abnormal structure of the sectioned surfaces of the compact bone, but microscopic examination of the same surfaces under low magnification brought out the fact that the Haversian canals were abnormally enlarged, although they were not enlarged sufficiently to cause a general coalescence of them.

Cases of Paget's disease which have been described in the literature have often been characterized by such conditions as the bowing of the tibia, the thickened diaphysis of the tibia, the encroachment upon the medullary canal of the same bone, and the resorption of the compact bone. Very frequently other bones of the skeleton are also affected. It is possible that if other bones of the skeleton, which the tibiae just treated were a part of, were available for examination, a more conclusive set of data might have been obtained. However, inasmuch as the tibiae which I have described compare so favorably with the classical descriptions, it seems reasonable to diagnose the case as one of Paget's disease.

BOOK REVIEWS

Thomas Young, F.R.S., Philosopher and Physician. By Frank Oldham. London, Edward Arnold & Co., 1933. 159 pp., portrait, 1 pl., 14 figs. in text.

Dr. Thomas Young (1773–1829), a precocious child of Quaker parentage, was early interested in the microscope and botany, and through the interests developed in building his own instrument, his attention was turned to mathematical physics and optics. Influenced by his great uncle, Dr. Brocklesby, he studied medicine at London, Edinburgh, Cambridge, and Göttingen. The acquaintances thus established were helpful in his later position as Foreign Secretary of the Royal Society. As a physician, he analyzed the optical structure of the eye, and laid the foundations of theories of color vision. He became the associate of Humphrey Davy in the newly founded Royal Institution, following the departure of Count Rumford in 1801–1802. His connection with that institution resulted in his "Lectures on Natural Philosophy and the Mechanical Arts" (1807). The next decade was devoted largely to medicine. His breadth of view is exemplified in his scholarly and comprehensive survey of medical education entitled "Preliminary Essay on the Study of Physic" (1813), his scholarly thoroughness in his "Introduction to Medical Literature" (1813, second edition 1823), and his "Practical and Historical Essay on Consumptive Diseases" (1815), and his understanding of significant work in his translation from the Swedish (a language unknown to him) of the "Animal Chemistry" by Berzelius. In 1816 he began to write on the mathematics of life insurance. In spite of these varied interests he found time to write the articles on Languages, Bridges, Carpentry, and Chromatics for the Encyclopedia Britannica (1820), and to direct committees of the Royal Society on longitude and on the tonnage of ships, and to prosecute his studies on hieroglyphics. His outstanding works are his contributions to the undulatory theory of light, and his analysis of Egyptian hieroglyphics. He was interested in the history of science and wrote biographies of nineteen men of science for the Britannica. The biographer errs in referring (p. 19) to Erasmus Darwin as "the father of the celebrated Charles Darwin" instead of grandfather.

C. A. Kofoid

French Medicine. By M. Laignel-Lavastine, Professor in the Medical Faculty of Paris, and M. Raymond Molinèry, Gold Medalist of the Academy of Medicine. Translated by E. B. Krumbhaar, M.D., Professor of Pathology, University of Pennsylvania. Clio Medica. N. Y., Paul B. Hoeber, Inc., 1934. 14 illus.

Prior to the thirteenth century there is nothing of particular interest in the medical history of France to distinguish it from that of other countries during similar periods. In the thirteenth century a number of illustrious names appear on its pages. Lanfranc, an Italian who passed most of his professional life in Paris; Albertus Magnus, the great encyclopedist; Arnold of Villa Nova, who taught at Montpellier; Henri de Mondeville, who wrote the first French work on surgery, and Guy de Chauliac, born as the century closed, whose "Chirurgia Magna" was held in high esteem for many subsequent generations.

One of the most interesting chapters in this book is that devoted to the origin and history of the Faculties. The oldest medical school in France was that at Montpellier, founded about 738, and long one of the leading schools of the country. The Faculty of Paris, founded in 1180, has naturally always occupied the leading position. The description of its organization, methods of teaching, and the vissicitudes which it has undergone from its origin to the present day are an absorbing chapter in medical history.

The history of many of the less distinguished Faculties, those of Toulouse, Bordeaux, Lyons, etc., is briefly recounted, sufficiently to indicate, however, that they have at various times played an important part in the development of French medical science. The chapter on the Renaissance refers necessarily somewhat briefly to the names familiar to all of us of the great Frenchmen who did so much for medical science during that epoch. Rabelais, whose fame as a physician is too much overshadowed by his greater fame as a humanist, Jean Fernel, Guido Guidi, Pierre Brissot, and Ambroise Paré raised the glory of French medicine to a great height throughout the world.

Though in the seventeenth and eighteenth centuries there was much good work done by the French in medicine, the beginning of the nineteenth century was marked by such an outburst of genius that the work of the preceding generations was thrown in the shade. It is sufficient to recall the names of the men who worked and taught in Paris in the first thirty or forty years of the nineteenth century to indicate the preeminence of French medicine during that period; Bichat (died 1802), Laennec, Corvisart, Bayle, Brettoneau, Broussais and, greatest of all, Louis, put clinical medicine and pathology on a new scientific basis and originated the modern conception of medical science and teaching. In surgery Larrey, Dupuytren, Velpeau, Nelaton and a number of their confreres were only rivalled by Astley Cooper, Abernethy and Brodie in England. The torch was maintained during later years by Claude Bernard, Magendie, Broca and a number of others, with the great Pasteur towering above all. Our only regret is that in a volume of this size it has been impossible for the authors to do full justice to the history of French medicine in the nineteenth century and, especially, to the great importance which it bears on the development of medical education and practice in this country, a subject which has never met with the adequate consideration to which it is entitled.

ERRATUM

HOW one's sins find one out! In my book on Leonardo I absentmindedly ascribed to John Hunter a statement made by his brother William and Dr. Dempster in his interesting paper in the recent number of the ANNALS seems, flatteringly but unfortunately, to have accepted my ascription. Sir Arthur Keith pointed out my error in his review of my book in *The British Medical Journal;* perhaps this note in the ANNALS will bring the *errandum* to the notice of American readers.

J. PLAYFAIR MCMURRICH
Toronto, Canada

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Editor: FRANCIS R. PACKARD, M.D., Philadelphia

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RIES · VOL. 7

1935

NO. 3 · MAY

ANNALS OF MEDICAL HISTORY

FRANCIS·R·PACKARD·M·D·EDITOR·[PHILADELPHIA]
PUBLISHED BIMONTHLY BY PAUL·B·HOEBER·INC
SEVENTY·SIX FIFTH AVENUE·NEW YORK·N·Y·

Entered as second class matter June 2, 1917, at the post office at New York, N. Y., under the Act of March 3, 1879.
Yearly Subscription, $10.00. Single numbers, $2.50.

ANNALS OF MEDICAL HISTORY

Editor: FRANCIS R. PACKARD, M.D., Philadelphia

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